Bicycle Master Plan

May 2006

CITY OF BALTIMORE
Martin O'Malley, Mayor

Alfred H. Foxx, Director
Department of Transportation

Otis Rolley, III, Director
Department of Planning

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DEPARTMENT OF TRANSPORTATION *Mission Statement:*

The Department of Transportation provides the City of Baltimore with a comprehensive and modern transportation system that integrates all modes of travel and provides mobility and access-ability in a convenient, safe and cost-effective manner.

Otis Rolley, III
Director, Department of Planning

DEPARTMENT OF PLANNING *Mission Statement:*

To provide the highest level of services and leadership in urban and strategic planning, historical and architectural preservation, zoning, design, development, and capital budgeting to promote the sustained economic, social, and community development of the City of Baltimore.

Adopted by the Planning Commission, May 4, 2006.

ACKNOWLEDGEMENTS

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PLAN WEBSITE

http://www.baltimorecity.gov/government/planning/bikeplan.html

The entire plan including maps and all associated documents are made available on the website.

Bicycle Master Plan

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The Bicycle Master Plan was initiated by the Mayor's Bicycle Advisory Committee on behalf of the bicycling community to promote and facilitate bicycling as a safe, convenient and comfortable form of transportation and recreation in Baltimore. A plan to coordinate the formal integration of bicycles in our existing infrastructure is necessary to improve safety and create a multi-modal transportation system friendly to the citizens of Baltimore.

INTRODUCTION

Baltimore has great potential to become a city where thousands of people ride bicycles everyday: there is a high level of residential development within two to three miles of the central business district; shared use paths along the Gwynns Falls and Jones Falls bisect the city from east to west and north to south; Baltimore has a large population of residents that do not own cars; and the city's system of parks and connecting parkways developed by the Olmsted Brothers is highly conducive to bicycle riding.

The design and implementation of this plan supports broad citywide goals including enhanced safety for city residents, opportunities for youth, healthy neighborhoods, and strengthening Baltimore's economy. The increased presence of bicyclists contributes to public safety with more eyes on the street. Bicycling is a great way for urban residents with busy lives to combine healthy exercise with daily travel. Accommodating future population growth typically means more automobiles, congestion and increased pollution. Providing a safe and convenient bicycle transportation system can help reduce the number of motor vehicles on city streets and the need for additional parking.

This plan also complies with the strategic plan of Baltimore's Department of Transportation that calls for a "comprehensive and modern transportation system that integrates all modes of travel and provides mobility and accessibility in a convenient, safe and cost-effective manner."

Bicyclist on waterfront.

The current Bicycle Master Plan (BMP) is the third major effort undertaken by the City to make bicycling safer and more enjoyable. Formal bicycle planning in Baltimore dates back to 1978 when the Baltimore Department of Planning prepared the Baltimore Bikeways development plan. That plan used existing bicycling counts and did not assume increased bicycling upon provision of facilities. As a result, a conservative plan with three bicycle routes was proposed and adopted. In 1993, the Planning Department staff created an update to the plan, but it was never formally adopted.

The BMP is distinct from the previous efforts. The BMP seeks to make Baltimore bicycle friendly and increase bicycling by constructing a comprehensive network and making policy and procedure adjustments within city government. It assumes low bicycling rates are due to poor infrastructure and a lack of accommodations. The BMP identifies gaps in the

system and recommends needed capital and operating investments to address these gaps. This plan also emphasizes safety, education and encouragement programs as key components for successful implementation.

This plan will guide Baltimore City in creating a lasting bicycle transportation program, by:

- mapping out an integrated on-street and off-street bikeway network,
- addressing bicycle parking and inter-modal bike/transit integration,
- stressing safety education for motorists, bicyclists and youths,
- providing an action plan for encouragement and enforcement,
- recommending transportation and development policy and program changes,
- describing new bicycle facilities designs,
- and detailing new roadway and trail maintenance management practices.

Over the next three years, an aggressive program of on-street bicycle transportation improvements will create an Introductory Network of bicycle facilities setting Baltimore on the right course for the 21st Century (see page 23, Map A). Baltimore's bicycle network will connect all of our neighborhoods to recreation, employment and activity centers within the city and to existing and planned bicycle facilities throughout the Baltimore region and along the proposed East Coast Greenway. Implementation of this program has already started incorporating new bike routes in Baltimore's capital improvements program and integrating bike lanes for road and bridge projects currently under design.

BENEFITS OF BICYCLING

Encouraging greater bicycle travel in Baltimore will bring many benefits to residents and visitors alike. These benefits are summarized below.

Congestion Relief

Increased bicycle travel will reduce the number of motor vehicles on Baltimore roadways, easing congestion and on-street parking demand.

Environmental Benefits

A primary source of air pollution in the Baltimore metropolitan region is auto emissions.[1] Motor vehicles are also a source of pollution for the Chesapeake Bay and Baltimore's tributaries. For short- and medium-distance trips, substituting the bicycle for the auto will reduce the amount of air pollutants washing into our waterways.

Baltimore and its surrounding metropolitan region are classified as a severe non-attainment area for ground level ozone by the U.S. Environmental Protection Agency. Cycling 8 miles prevents 15 lbs. of air pollutants from contaminating the air. Bike travel already reduces automotive pollution by 1 percent nationally and saves an estimated 700 million gallons of fuel annually.

Economic Benefits

In the region, thirty-five percent of household income is spent on housing. After housing, motor vehicles are the second-highest household expense for Baltimore families. Regular bicycling, complemented by the existing transportation options in Baltimore, can allow a single person to live without a car or a two-car family to give up a second car (typically a $6,000 to $7,000 annual expense).[2] The recent and continued appreciation of housing values makes these numbers very conservative. Bicycling for transportation can improve the mobility of some of the 326,000 Baltimore residents who do not have access to a car.

Approximately 50% of Baltimore residents live in a household where they do not have access to a motor vehicle.

Bicycling can help bring tourist dollars into the city. Active vacations are one of the fastest growing sectors of the tourist industry. Bicycling also allows tourists to travel more quickly between sites and enables neighborhoods outside of downtown to attract visitors and tap into the spending power of the 45 million tourists who come to Baltimore annually.

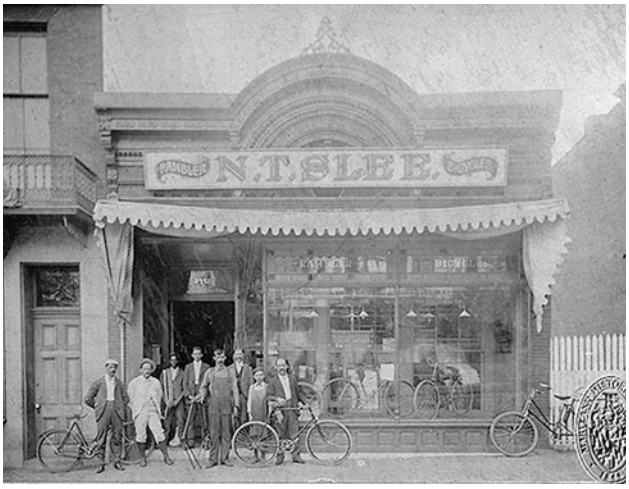
Health Benefits

Increased levels of bicycling will improve the health of Baltimore residents. Biking to the store, school or work provides a time-efficient, low-cost way of attaining the U.S. Surgeon General's recommended daily allowance of physical activity. Bicycle exercise can help reduce heart disease, diabetes, obesity and other chronic illnesses, which are not uncommon in Baltimore.

HISTORY OF BICYCLING IN BALTIMORE

Bicycling has long been a part of the culture of Baltimore. In the late 19th Century and early 20th Century, Baltimore was at the forefront of the *Great American Bicycling Craze* that spread through the East Coast and the nation. In the early 1900's, Mrs. William H. Row reflected on her husband's life of bicycling through the turn of the century, "…back in the [18]90's Baltimore was bike crazy. There were hundreds of 'wheels' on the streets. There were a score of cycling clubs and every Sunday there were outings and races and endurance tests. There were even elaborate tracks for professional racing, and the top riders made headlines on the sports pages."[3]

Another report estimated that by 1916 Baltimore had 80 or 90 bicycle shops, many started by enthusiasts who gave up other professions to live and breathe their favorite sport.



Credit: Maryland Historical Society

N. T. Slee Bicycle Shop on Madison Avenue, c. 1895.

[1] Maryland Department on the Environment reports that 30-40 percent of the pollution that causes ground level ozone comes from motor vehicle use, http://www.mde.state.md.us/air/air_quality/index.asp.

[2] Based on calculations from Making Housing Affordable by Reducing Second-Car Ownership, Patrick H. Hare, 1995. Adjusted for inflation and today's gas prices.

[3] *I Remember When Cyclists Were Headliners*, Mrs. William H. Rowe, Enoch Pratt Free Library, Maryland Room

1930's and '40s

In the late 1930's Baltimore experienced its first bicycling revival. In July 1938, the Evening Sun reported, "Cycle riding comes back with a bang, bang here. Thousands taking up sport as city ropes off spaces in parks—rental agents report business is booming."

The automobile had taken over the roads in the 1920's and 30's, so this revival saw crash rates soar, especially among the thousands of kids that were riding bikes to school. To address this issue the Police Department, Safety Council, teachers, school officials and students partnered to undertake an education and enforcement campaign. Largely a student initiative, Hamilton Junior High started a program that was spread to schools throughout the city. Program activities included bicycle inspections, formulation of safe riding rules, a safety pledge campaign, and organization of a Cycle Safety Club with a membership card and license tag for student bicycles. A student safety scout force patrolled the schools and neighborhoods and issued tickets to rule violators, and a student court meted out justice.

The 1970's and the Oil Crisis

After another decline, cycling came back again in the 1970's. At this time, city promoters started an annual 12-mile historic bicycle tour along the inner harbor and bike commuters started clamoring for a plan to improve conditions on roadways and promote the clean and energy-efficient mode of travel. Three new bike routes were established: 1) Roland Avenue, 2) the Herring Run Trail, and 3) Rogers/Ken Oak/Cross Country Blvd./Kelly Ave. and a bicycle lane was created on the ring road around Lake Montebello. But for a variety of reasons, only a portion of these plans were carried out and the few bikeways created had little impact on changing overall bicycling conditions.

BICYCLING TODAY

Who Bicycles in Baltimore?

Information gathered in the survey and based on observation suggests that bicyclists using the streets today might be categorized in the following groups:

- Hearty bicycle commuters.
- Regular fitness and recreational riders.
- Inner city dwellers who, for social, environmental or economic reasons, live without a car and use a bicycle as one among multiple transportation alternatives.
- People who occasionally use a bicycle for utilitarian transportation, typically on short, bicycle-friendly routes. Trip purposes might include visiting a park, going to the library, running errands, shopping, visiting friends, etc.

Bicycle commuter in Druid Hill Park.

Gwynns Falls Trail passes under a railroad viaduct.

Why Baltimoreans Bicycle

Baltimore is experiencing resurgent interest in bicycling. The increasing sense of safety, influx of new residents with new attitudes about transportation, enticement of the expanding trail system, and swiftly increasing gas prices are primary forces behind this resurgence. Ongoing factors include low car ownership rates, the need for close to home recreation and fitness, residents' devotion to Baltimore's great parks, which have retained their popularity for recreational biking, and the number and variety of bicycle events held annually.

Bicycle events staged in Baltimore draw large numbers of people. The 8th annual JFX Celebration which hosts a ride on a section of the Jones Falls Expressway, closed to motor vehicle traffic for the event, attracted 4,000 riders in 2005. No less than seven major bicycle rides take place on city streets and trails annually.

This interest is translating into increased demands upon city government to improve bicycling conditions. In 1997, the Mayor's Bicycle Advisory Committee was formed through citizen request. To kick off this plan, more than 100 bicyclists and advocates attended the first public meeting, on a cold winter evening in January 2005.

Why Baltimoreans Don't Bicycle

Bicycling on Baltimore's arterial streets and roadways is largely for the brave at heart. Many cyclists are not comfortable in Baltimore traffic and are discouraged by the lack of dedicated space provided in the roadways. Others often find pavement conditions unsafe, street drainage grates a danger, or secure bike parking hard to find. Additionally, drivers in Baltimore have been observed by cyclists as hostile to their presence on the roads. One Baltimore resident summed up the situation this way, "traffic is too heavy, the pavement is too rough, and there is no space for bikes."

Conditions such as these not only limit bicycling's ability to grow in overall popularity, but create a significant disincentive for residents to choose the bicycle for recreation, commuting or other utilitarian trips.

Bicycle Commuting

Table 1 shows that Baltimore bike commuting rates are far lower than comparable east coast cities such as Washington, DC, Philadelphia, and New York City. However, they are higher than mid-western industrial cities with a similar social and demographic history, such as Cincinnati and Detroit.

Bicycle Commuting in Selected U.S. Cities[4]

CITY	BICYCLE MODE SHARE
Madison, WI	3.19%
San Francisco, CA	1.98%
Seattle, WA	1.88%
Washington, DC	1.16%
Philadelphia, PA	0.86%
New York, NY	0.47%
St. Louis, MO	0.35%
Baltimore, MD	**0.33%**
Cincinnati, OH	0.19%
Detroit, MI	0.16%
Nationwide Average (includes suburban and rural areas)	0.38%

Table 1: Bicycle Commuting in Selected U.S.Cities.

[4]U.S. Census Bureau. State and County Quickfacts, Online:
http://factfinder.census.gov/servlet/DTGeoSearchByListServlet?ds_name=DEC_2000_SF3_U&_lang=en&_ts=93199688005, 2004.

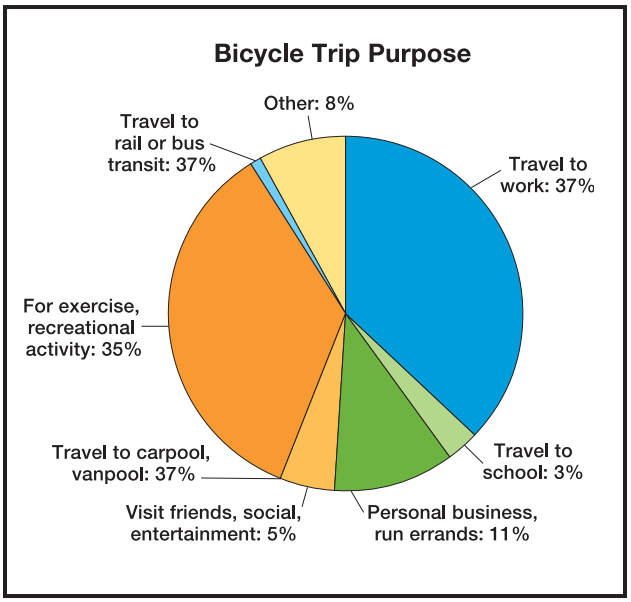


Figure 1: Master Plan Bicycle Survey, 2005.

Fifty-nine percent of those responding to a survey conducted as a part of this planning process, reported that their last bicycle trip was for a non-commuting purpose such as for exercise, recreation, visiting friends, or personal business (see Figure 1).

Moreover, according to *Journey to Work* data, gathered as part of the 2000 U.S. Census, only 0.33 percent of employed Baltimore residents use the bicycle as their most common form of travel to work. While this data does not include the many non-work trips people make by bike, and is collected in such a way that usually results in an undercount of bike commuting, it still points to low bike commuting rates, as well as low bike use for all transportation purposes.[5]

POTENTIAL FOR INCREASED BICYCLING

Despite less than ideal roadway conditions, Baltimore has tremendous potential for higher levels of bicycling.

Street Network and Urban Design

The street network and housing stock is designed to support significant population densities and many neighborhoods are developed on pre-WWII land use patterns, meaning that residential uses are mixed with neighborhood retail, employment, and other activities, significantly increasing the amount of urban travel that involves short trips, for which the bicycle is most effective.

There are 411,600 jobs in Baltimore and many are located in or near the relatively small and centrally located downtown.[6] Others are at major institutional campuses spread throughout the city such as hospitals and medical centers, universities, industrial parks and government office complexes. Almost all of these locations are easily accessible by bicycle.

Cyclist crossing the North Avenue bridge.

Baltimore has growing residential neighborhoods in and around the downtown core, putting many residents within 2-3 miles of downtown jobs. For many people in the close-in neighborhoods, trips to the downtown area are too far for walking and inconvenient to make with a car due to traffic congestion and parking

[5] This number does not include trips made by the following people: those 15 and under, those who are unemployed or underemployed, those who sometimes bike to work but not regularly, and those who use bicycles for non-work trips. Moreover, it is based solely on reported travel patterns for a single week-long period in March.

[6] Bureau of Economic Analysis, 2004.

costs. Buses are slowed by congested surface traffic and the rail transit lines serve only limited corridors. Thus, bicycling is often the fastest way to travel to and through downtown.

City Demographics

Carless households hold great potential for increased bicycle ridership in the City. Approximately 325,788 Baltimore residents live in households without an automobile or are too young for a driver's license.[7] Moreover, carless households predominate in a number of neighborhoods that are within 2 miles of the Central Business District (see Figure 2).

Bicycling is an inexpensive mode of transportation that can enable low-income people to find and keep jobs, access health care services, and take advantage of shopping, education, and recreational opportunities.

Development Opportunities

With new residential and commercial development occurring throughout the city, the high tech job supply increasing, and strong neighborhoods to build on, there is great potential to increase bicycle use for commuting, other transportation needs and recreation.

To increase usage of bicycles for transportation and improve safety, clear goals and objectives need to be established.

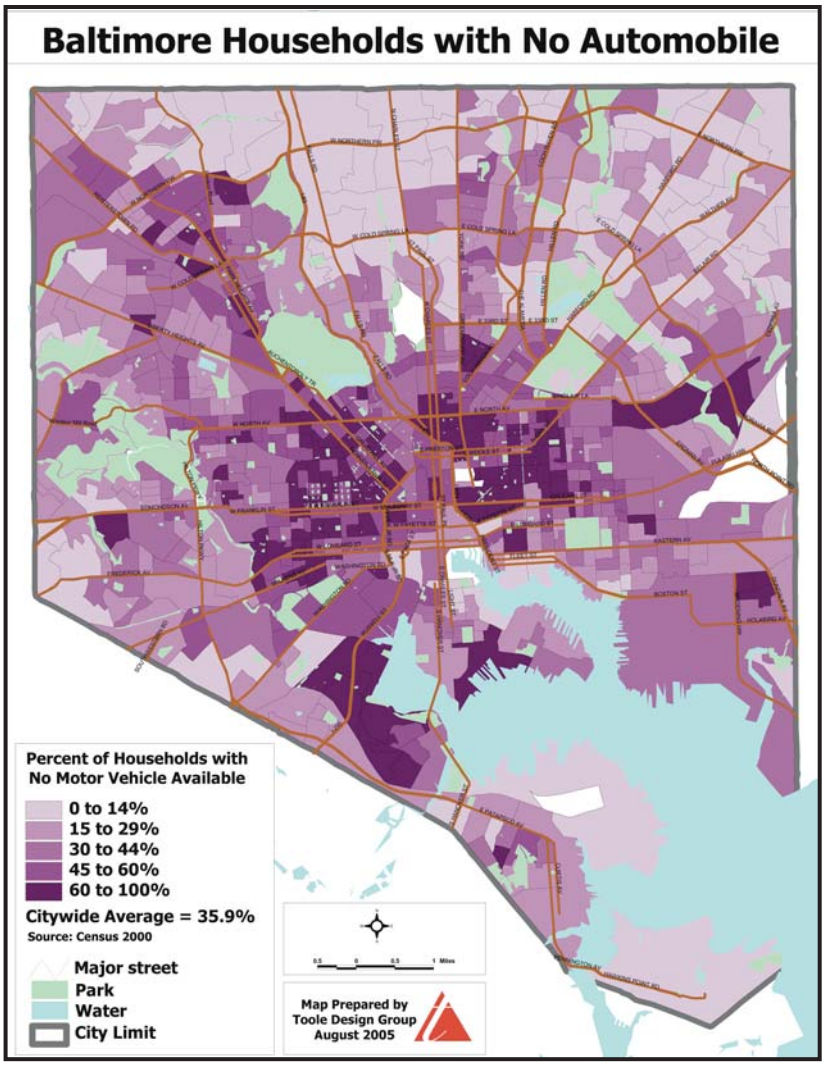


Figure 2: Distribution of Households Without Access to a Motor Vehicle, Year 2000 US Census data.

[7] U.S. Census Bureau. State and County Quickfacts, Online: http://factfinder.census.gov/servlet/DTGeoSearchByListServlet?ds_name=DEC_2000_SF3_U&_lang=en&_ts93199688005, 2004.

SUMMARY OF GOALS AND OBJECTIVES

Mission: *To promote and facilitate bicycling as a safe, convenient and comfortable form of transportation and recreation.*

GOAL 1

DEVELOP A COMPREHENSIVE NETWORK OF FACILITIES FOR BICYCLISTS.

OBJECTIVE 1: Make bicycling safe and inviting on the streets of Baltimore.

- Implement proposed bicycle route network (see Map A on page 23 for Introductory Network).
- Improve continuity of on-street network by overcoming negative impact of existing barriers (see Appendix A and B for lists of intersections and areas where small connector paths are needed).
- Consider the adopted bicycle route network in prioritizing street resurfacing, reconstruction, and streetscape projects.
- Coordinate planning, design, and implementation of bicycle facilities with other city plans.
- Coordinate planning, design, and implementation of bicycle improvements near the City line with Baltimore County, Anne Arundel County, Maryland State Highway Administration (SHA) and the Baltimore Metropolitan Council.

Bike Lane on Bush Street that extends to Gwynns Falls Trail.

OBJECTIVE 2: Increase the availability of bicycle parking and support facilities at destinations across the city.

- Launch a bicycle parking initiative.
- Require new development to provide bicycle parking.
- Improve bicycle parking at transit stations in support of a multi-modal transit system (for list of existing facilities and preliminary needs assessment, see Appendix C).
- Develop bicycle commuting/rental centers to provide focal points for bicycle transportation services and promotion.

OBJECTIVE 3: Fully integrate bicycling with all public transit facilities and services.

- Work with the Maryland Transit Administration (MTA) to accommodate bicycles on all public transit in support of a multi-modal transit system.
- Explore the potential for bicycle accommodations on the water taxi.

OBJECTIVE 4: Develop off-road paths to create a connected trail system.

- Complete ongoing trail development projects.
- Develop new and extend existing trails (for a list of potential trails and extensions, see Appendix D).
- Improve neighborhood access to trails.

GOAL 2

IMPLEMENT SAFETY, EDUCATION AND ENCOURAGEMENT PROGRAMS TO INCREASE BICYCLE USAGE.

OBJECTIVE 1: Improve enforcement of traffic laws related to bicycling.

- Develop partnership with the Baltimore City Traffic Safety Coalition, Department of Transportation Safety Division, Baltimore City Police Department, and the Mayor's Bicycle Advisory Committee to identify and address bicycle-vehicle safety measures with enforcement and new or amended laws.
- Provide training for Baltimore police officers regarding bicycle safety laws and issues faced by on-street bicyclists.
- Identify the most common conflicting movements between bicycle and vehicle users and determine enforcement mechanisms to mitigate these conflicts.
- Develop an amendment for the law restricting bicycle riding on sidewalks and the park rule restricting bicycle riding on park paths.

OBJECTIVE 2: Educate the public (motorists, bicyclist, and pedestrians) about bicycle and vehicle operation in urban traffic conditions.

- Educate existing motorists and bicyclists about mutual rights and responsibilities (suggested programs listed in Appendix E).
- Educate future motorists, bicyclists and pedestrians (ie. children & youth) about safe travel behavior and vehicle operation.
- Using new Federal funding, create and implement Safe Routes to School program.

Walk to School Day in Baltimore.

OBJECTIVE 3: Encourage increased bicycling by promoting health, recreation, transportation, and tourist opportunities.

- Establish partnerships with health organizations to promote bicycling as healthy transportation.
- Promote bicycling for commuting, errands, socializing, and exercising (for potential program list, see Appendix E).
- Develop and market a City of Baltimore Bicycle Map.
- Partner with Baltimore Area Convention and Visitors Association and the Baltimore Office of Promotion and the Arts to promote bicycling opportunities.

GOAL 3

INSTITUTE POLICIES THAT SUPPORT IMPLEMENTATION OF BIKE MASTER PLAN GOALS AND OBJECTIVES WITH COMMUNITY SUPPORT AND INPUT.

OBJECTIVE 1: Create structure to implement the Bike Plan goals and objectives.

- Create a Bicycle Coordinator position in the Department of Transportation to guide and facilitate the implmentation of the Bike Master Plan.
- Support Mayor's Bicycle Advisory Committee (MBAC).
- Review and update the Bicycle Master Plan every 6 years.

OBJECTIVE 2: Institute new policies and procedures in the Departments of Transportation and Planning to support Bike Master Plan goals.

- Utilize the following resources to guide bicycle facility planning and design in the Department of Transportation and other agencies: 1) Map C—Preliminary Facility Types, 2) the *Bicycle Facility Design Toolkit*, 3) nationally recognized and accepted bicycle facility design guides (see Appendix F), and 4) Section IV of this plan.
- Provide sufficient funding through the Capital Improvement Program (CIP) for implementation of independent bicycle improvement projects identified in this plan.
- Build internal capacity to design and implement bicycle facilities by providing ongoing training for city staff.
- Adopt policy requiring new development to mitigate traffic impact by providing bicycle facilities or contributing to a fund that is dedicated for bicycle facilities and improvements.
- Begin a bicycle data collection program.

OBJECTIVE 3: Update street and trail repair and maintenance practices to ensure bicyclists safety and comfort.

- Develop procedures for maintaining public bicycle facilities.
- Establish bicycle related service requests via the 311 Call Center and online CitiTrack Service Request System.
- Update specifications for routine and emergency street resurfacing and repair to ensure safe traveling routes and surfaces for bicyclists.

Safe Routes To School planning group.

Existing Conditions and Programs

SECTION II

Prior to developing the plan goals and objectives, an analysis of bicycling conditions throughout the City was undertaken. The findings are organized around two topics: 1) existing bicycling conditions on city streets, transportation infrastructure and in other public spaces and 2) existing city programs that address issues affecting and related to bicycling.

TRANSPORTATION INFRASTRUCTURE

Baltimore has a mix of areas that are both difficult and delightful for bicycling. Downtown Baltimore, most of the central core and most arterial roads are avoided by many cyclists due to heavy traffic, narrow travel lanes and poor pavement conditions. However, the stream valley trails, park roads, parkways and residential streets, can be favorites for cyclists of all abilities.

Temporal variables affect the bicycle-friendly nature of some streets making them alternately good and bad depending on the time of day, day of the week and/or season of the year. There are many streets that recreational riders report as favorites when used on Saturday or Sunday, but commuters report as "avoid at all cost" during weekday morning or evening rush hours. Other streets vary based on the location of each segment. Charles and St. Paul streets are good examples of thoroughfares that are much more bicycle-friendly along the sections that are in the Charles Village and Guilford neighborhoods as opposed to sections in Mt. Vernon and downtown.

Summary of Existing Facilities and Services

Baltimore's two best and most loved bicycle facilities are the Gwynns Falls and Jones Falls trails. The Gwynns Falls Trail is complete along a 14-mile stretch and will eventually connect the Park and Ride lot at I-70 to the Inner Harbor. The Jones Falls Trail is complete along a 1-mile stretch with 7 additional miles in design or construction for completion by 2010.

Jones Falls Trail on Wyman Park Drive.

Outside of the new trail systems, Baltimore has only a few dedicated bicycle facilities. A newly signed bike route has been installed between the Inner Harbor and Ft. McHenry, in conjunction with new bike lanes on Fort Avenue. Bike lanes have been installed on Bayard, Bush, Ridgely, Ostend and Warner to provide continuity for the Gwynns Falls Trail on the leg that connects it to the Inner Harbor. For many years, Lake Montebello has had a special bike and pedestrian lane striped in the loop road around the reservoir. The 1970s bikeways initiative created a striped lane along Roland Avenue, which is available to cyclists but is not designed to current standards.

Some public buildings and universities have bicycle racks and lockers. However, many bicycle racks throughout the city are of substandard quality, design and quantity. For example, bicycle parking at Penn Station is frequently full.

Bicycles are permitted on all Maryland Transit Authority (MTA) Light Rail and Metro Subway service except on crowded trains. If the train is crowded due to morning or evening rush hour, sporting events or special events, bicyclists are requested to wait for the next train. The MARC trains currently only allow folding bicycles fully enclosed in a suitable carrying case. Many of the MTA stations are equipped with bicycle racks and lockers. A full list of MTA rack and locker locations can be found in Appendix C.

A summary of existing facilities is provided in Table 2.

Existing Bicycle Facilities

QUANTITY	BICYCLE ACCOMMODATION
4.7 miles	On-street Bike Lanes
13.8 miles	Off-Street Bike Paths (shared use trails)
2.3 miles	Signed Bike Routes
4	Transit Stations with Bike Lockers
11	Number of Rail Transit and Train Stations with Bike Parking
< 25	Bike Racks in public space that meet minimum design standards

Table 2: Existing Bicycle Facilities.

Unsafe storm drain grate.

Summary of Difficult Conditions

In addition to the general lack of bike facilities, the planning process identified the following list of conditions[8] that make bicycling difficult, unappealing and at times unsafe:

1. Inadequate space for bicycling on downtown streets, which have large volumes of motor vehicles.
2. Large arterial roadways with high-speed traffic and no bike facilities or striped shoulders.
3. Road surface problems: poor pavement, prevalence of potholes, uneven seams and debris on the right side of the road.
4. Utility and storm water infrastructure problems: crumbling gutter pans and curbs and hazardous storm water drainage grates and utility covers.
5. Numerous complex and large intersections with vehicles turning in many directions.
6. Poor access on some bridges, including approach sidewalks lacking curb ramps, narrow passageways on the bridges, and discontinuities such as stairs, that force bicyclists to dismount.
7. City ordinance making bicycling illegal on all sidewalks.
8. Curbside parking allowed on the preponderance of streets, which frequently places cyclists in the door zone of parked cars.

[8] This list is based on comments received at public meetings, feedback gathered from the Plan Survey and analysis conducted by consultants and staff.

9. Scarce bicycle parking; and existing bike parking of poor quality.
10. General lack of respect for bicyclists among motor vehicle drivers.
11. Conflicts with buses.
12. Significant street discontinuities and neighborhood divisions created by a variety of barriers.

Given these conditions, encouragement alone is unlikely to result in significant increases in bicycling. Clearly, conditions must change before levels of bicycle use will rise.

Baltimore area cyclists agree. According to sixty-four percent of Baltimore bicyclists participating in the Plan Survey, providing more and better bicycle accommodations (building bikeways and providing bike parking) would be the most effective way to encourage more people to use bicycles for transportation. Full survey results can be found in Appendix G; the survey form in Appendix H.

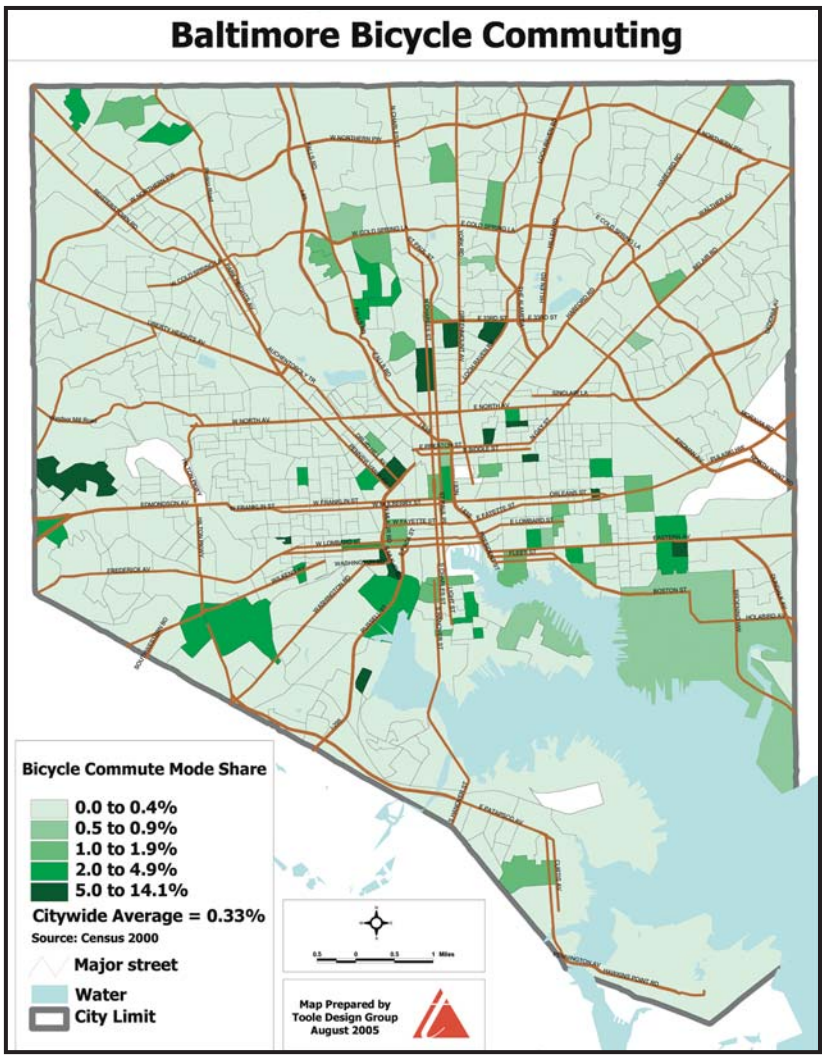


Figure 3: Distribution of Bike Commute Trips to Work; Year 2000 US Census data.

EXISTING BICYCLE-RELATED PROGRAMS

A review of existing bicycle-related programs within city agencies and local non-governmental organizations was conducted as a part of the planning process. The following is a summary of key findings.

Law Enforcement

Training specific to bicycle safety and enforcement is not currently provided at the Baltimore Police Academy and bicycle safety or enforcement issues are rarely mentioned at daily roll call, the venue for new information or updated enforcement instructions. Currently, enforcing laws related to bicycle operations and safety in traffic is not among the department's highest priorities, however the Department is conducting periodic pedestrian safety sting operations at high accident locations and speed reduction operations using funding from the Maryland Office of Highway Safety grants program.

The Department continues to operate a bicycle registration program to aid in theft reduction and bicycle recovery.

The International Police Mountain Bicycle Association is based in Baltimore County. This organization provides training and other support to bicycle-mounted police units for Police Departments around the world.

Health and Safety

The Baltimore Department of Transportation has one staff person working on pedestrian safety education. Walk to School days are organized annually in October in conjunction with nationwide efforts and other safety programs are coordinated with a stakeholder group, the Baltimore City Traffic Safety Coalition.

Through the Baltimore City Traffic Safety Coalition, an elementary school safety training program of the Washington Area Bicycle Association (WABA), launched in and around Washington DC, was extended in 2005 to nearby counties and Baltimore City. Training to prepare teachers to use the equipment and associated curriculum is offered by WABA and is being promoted through the coalition to Baltimore City Public School teachers. This program is designed to teach both basic bicycle riding skills and proper operations for safety in traffic.

From 2000 - 2002, in Baltimore City, an average of 306 traffic crashes per year involved bicyclists.

The Department of Transportation also operates Safety City at Druid Hill Park, a miniature town where traffic safety is taught experientially to elementary school students. Additionally, in the poor weather months, instructors work inside public and private schools in Baltimore. From January through March 2006, these instructors served 15,000 kids.

Reporting Unsafe Street Conditions

311 is Baltimore City's overall citizen complaint and service request call-in system. Currently, 311 accepts requests for removal of abandoned vehicles, park maintenance needs, pothole repair, street cleaning, street repair and traffic sign replacement.

Local bicyclists have also launched a web-based reporting system for bicycle infrastructure issues and needs. It is at http://www.margieroswell.com/maps/bike.htm. It provides a location to report problems such as the following, and located them on a map so that other cyclists can be made aware:

1. Parallel storm drain grate
2. Curb cut needed
3. Narrow lane
4. Very narrow shoulder
5. Dangerous pavement
6. Needs striping or re-striping
7. Dangerous merge area
8. Blind spot

Orientation Map Panel at Gwynns Falls Trail Access.

Recreational Bicycling

While there are too many recreational programs and opportunities to catalog here, a few are worth noting. The Baltimore Bicycle Club offers organized group rides for riders at a variety of skill levels. They also organize bicycle racing events and cooperate with other organizations in the Mid-Atlantic with regard to these activities.

The Baltimore Department of Parks and Recreation manages the Gwynns Falls and Jones Falls Trail and many other parks and trails where bicycling is accommodated and popular. At Carroll Park, a Bike and Skate Facility provides a venue for trick bike riding.

Tourism

The Baltimore Area Convention and Visitors Association distributes information about bicycling in Baltimore. They operate the visitors center at the Inner Harbor and will be installing a trailhead marker outside the center for all trails and walks in Baltimore City, including the Gwynns Falls Trail. The Center is available as a space to schedule promotions such as displays, information tables, or information videos. Non-vehicular tours are promoted by staff including the following—Heritage Walk, Mt. Vernon, Federal Hill and Fells Point Ghost Tour. Visitors seeking bicycle rental are directed to a nearby bicycle shop.

The Baltimore Office of Promotion and the Arts uses a bicycle tour to celebrate their successful mural program and distributes information about other bicycle rides.

Both agencies use the Baltimore Fun Guide website to list all events, including the bicycle and non-motorized events listed above.

Bicycle Advocacy and Resources

The Mayor's Bicycle Advisory Committee serves as the citizen's link to Baltimore City government for concerns related to bicycling. This group meets on the third Tuesday of every month and works on planning, agency coordination, physical problems with existing trails or bike facilities, and an annual bicycle ride, Tour dem Parks, Hon.

One Less Car, an advocacy organization, supports a wide variety of bike events, concerns, and movements. Among other things, they coordinate a state-wide lobby day in Annapolis during the legislative session, provide a citizen voice on bicycle and pedestrian committees locally and state-wide, and run the Cycle Across Maryland bicycle ride.

Other groups in Baltimore include Baltimore Spokes, an internet based bicycle community discussion board, and Velocipede, a design-stages bicycle repair education cooperative.

Master Planning Process

SECTION III

This plan represents a collaborative effort of the Baltimore City staff project team, the public and consultant specialists.

PUBLIC INVOLVEMENT AND OUTREACH

Kick-off Meeting

The planning process was launched with a large public meeting in January 2005. More than 120 people gathered in the Department of Planning Pheobe B. Stanton Boardroom to participate in an interactive workshop.

Working in teams, participants marked up maps indicating the destinations they want to go to by bicycle, the routes they prefer to use today for recreation and transportation, the streets they avoid, and where bicycle parking or other amenities are needed. The maps were used by City staff and the consulting team as the starting point for creating a network of bicycle routes and improvements focused on on-street facilities.

January 2005 Bicycle Master Plan public meeting.

Participants also participated in brainstorming "Big Ideas" that should guide Baltimore in its efforts to improve bicycle safety and increase bicycle use. These ideas were organized into subject areas that include Encouragement, Education and Safety, Enforcement, Maintenance, Law and Policy, and Miscellaneous.

Survey

An online survey was developed to provide an additional opportunity for public input. This survey was also distributed on paper at the public meeting and through other venues for a period of three months, January through March 2005. See box on page 19 for a summary of results. See Appendix H for an example survey form and Appendix G for complete survey results.

Draft Master Plan Meeting and Public Comment Period

On January 18, 2006, the draft Bicycle Master Plan was unveiled at a meeting attended by more than 100 people. Attendees were presented with details on the progress and process since the first meeting, draft goals and objectives, and maps of the proposed Introductory and Full Bicycle Route Networks for Baltimore City.

Questions and comments were taken at this meeting and through a public comment period that ran from January 19 through February 8, 2006. Copies of the Draft Master Plan, Appendix, Introductory and Full Network Maps were posted on the internet and were distributed to every public library in Baltimore City.[9] Comments received were taken into consideration in preparing the Final Bicycle Master Plan.

Planning Commission Hearing

To become official city policy, Master Plans must be adopted by the Baltimore City Planning

Commission. This plan was adopted on May 4, 2006. Preceding the hearing, the final master plan document (including maps A, B, and C, appendix, and the design toolkit) was posted to the internet and meeting notification was sent to everyone who provided contact information through meetings, surveys, or comments.

REVIEW OF PREVIOUS AND ONGOING BIKE PLANS

To supplement input from the bicycling public, a review was conducted of maps and planning documents developed in previous bicycle planning efforts and ongoing transportation and community planning processes. A base map was developed using the City's Geographic Information System data, which was supplemented by some bicycle specific data provided by the Baltimore Metropolitan Council.

Coordination with Baltimore County and their bicycle planning efforts was also undertaken, resulting in identification of a number of cross jurisdictional routes of mutual interest.

ADVISORY COMMITTEES

Two Advisory Committees had ongoing involvement with the plan: the Mayor's Bicycle Advisory Committee and a Technical Advisory Committee consisting of representatives of various City agencies (see Acknowledgements page for membership). Each of these committees reviewed draft and final proposed Bicycle Network maps as well as proposed plan recommendations and the Facility Design Toolkit and Standard Details.

TECHNICAL ANALYSIS

Consulting staff measuring an East Baltimore street.

A variety of methodologies were used to determine which streets should be included in the Bicycle Network.

First, a preliminary bicycle transportation network of about 500 miles of roadway was identified based on public input and routes that were mapped in prior planning processes. Most of this network was field inspected by car and bicycle. Some was reviewed on GIS-aerial photography provided by the City. Bicycle Level of Service evaluations from 2003 were available for some arterial roadways, as were Annual Daily Traffic (ADT) counts.

A variety of criteria were used to evaluate and screen the routes for selection into a Draft Bicycle Network. This Draft Network was reviewed by the public, the Technical Advisory Committee and the Mayor's Bicycle Advisory Committee. Comments from these groups were incorporated to define the set of streets in the Full Bicycle Network (Map B).

A variety of criteria were used to select streets for the Network, including suitability for bicycling without improvement, potential to be improved, destinations served, public interest in the route, contribution to overall connectivity, coverage of the city, and other factors.[10] The Draft Network included approximately 415 miles of streets and roadways (excluding trails and other off-road connectors).

The second task of the technical analysis was to identify up to 50 miles of roadway for which preliminary bicycle facility types could be identified. This analysis resulted in 150 miles of preliminary bicycle facilities being identified, (see Map C). An additional 90 miles of streets and roads were found to be generally sufficient as shared use roadways with little or no improvement. See Appendix I for details.

The third task was to evaluate routes regarding relative ease of implementation and timing considerations to create a relative order of priority. The objective of this task was to identify routes that could become part of an Introductory Network to be created in the near term and guide plan implementation and funding decisions. During this task, preliminary routes were cross-referenced with roadways already slated for future improvements in the Capital Improvement Program (CIP).

While identification of an Introductory Network relied heavily on these logistical considerations, the goal of creating a comprehensive and continuous network for the city was tantamount. It was important that the Introductory Network, serve popular destinations, be city-wide in scope, not have significant gaps, not miss key opportunities, serve a variety of bicycling styles and skill levels, and include on-street improvements, not just signed shared roadway. For this reason, the implementation plan includes a mix of simple and complex projects through all stages.

Criteria provided by City transportation staff were used to evaluate routes in terms of project complexity and feasibility of implementation in the near term.

Survey Results

Informal surveys were made available to interested Baltimore residents through a variety of mechanisms over a multi-year period. Surveys were distributed at bicycle rides, libraries, universities, and at the January 2005 Public Meeting. The survey was also made available online for about three months in early 2005.

In total, 326 surveys were completed. Most survey respondents were experienced with bicycling in the city.

Highlights Include:

Preferred facilities for bicycling:

- 43% - Bike lanes
- 31% - Street with no facilities
- 19% - Bicycle paths
- 7% - Sidewalks

Factors for choosing to bicycle:

- 75% - Safety of travel route
- 9% - Weather
- 53% - Traffic
- 39% - Need for exercise

Respondent profile:

- 58% Men, 42% Women
- Average age: 36
- Use bicycle 3 days/week on average
- 30% involved in a crash

[9] www.baltimorecity.gov/government/planning/bikeplan.html

[10] For a detailed list of criteria, see Section IV.

EARLY ACTIONS

To demonstrate the City's commitment to bicycling, during the course of this planning process, City staff initiated planning on one new bicycle project, the Collegetown Bike Route, and implemented a second, the Fort McHenry bike route. Three other bicycle projects were reviewed for compatibility with the plan and to consider improvements to facility design:

- Inner Harbor Trail section
- Roland Avenue Bike Lane Plans
- Jones Falls Trail-Clipper Mill section

Moreover, it was important to consider integration of bicycle accommodations into road and bridge improvement projects that were already underway. Three projects that were in design or construction during the planning process were reviewed and modified to address integration of bicycle accommodations into the facilities being improved:

- Edmonson Avenue Bridge over Gwynns Falls
- Harford Avenue Bridge over Herring Run
- Potee Bridge and approach roads

SPECIAL STUDIES

Also as a part of the master plan process, five special studies were undertaken to provide a more detailed look at some of the more complicated projects the City may need to implement in the near term. These included:

- Hopkins & Charles Plaza Connection
- Water and Redwood Streets Cross-town Route
- Veterans Memorial Bridge Accommodations (Hanover St.)
- Jones Falls Trail/Inner Harbor East Trail Connection.
- Charles Street

The Bicycle Network

SECTION IV

The Bicycle Network proposed in this plan is a 450-mile system of on-street and off-street bicycle facilities and routes.

Because the planned trail network is well established, this plan focuses primarily on the on-street system, however multi-use trails and key sidewalks and promenades selected for shared use among bicyclists and pedestrians will be addressed briefly in this section. The on-street Bicycle Network is comprised of striped bicycle lanes and other on-street facilities, signed bicycle routes, intersection improvements, and small off-street connections. For implementation purposes, the on-street bicycle facilities and routes are organized into three groups, or phases: 1) The Introductory Network, 2) Medium Term Network Additions, and 3) projects with Variable Timing & Long Term Priorities. Map A (see page 23) shows the Introductory Network. Map B, available only in poster size, shows the Full Network, i.e. all three phases.[11]

This section of the plan establishes the Network objectives, discusses its policy implications, and describes the criteria used to select Network routes and the criteria used to prioritize these routes for implementation. It also describes the various types of facilities and improvements needed to implement the Network and provides a pictorial glossary of select bicycle facility types.

There are other, more advanced, facility types being used across the country and in Europe that this plan does not recommend in the near term, but which should be considered over time (for a list, see Appendix J).

Key to Plan Maps

Map A - *Introductory Bicycle Network*
[format: 8.5 x 11 & poster]

- Tier 1 & 2 On-Street Facilities and Routes
- Related Intersection Improvements
- Related Off-Street Connectors
- Primary Trails

Map B - *Full Bicycle Network*
[format: poster only]

- Tiers 1-5 On-Street Facilities and Routes
- Connections to Surrounding Jurisdictions
- All Intersection Improvements
- All Off-Street Connectors
- Existing, Planned and Proposed Trails

Map C - *Preliminary Facility Types*
[format: poster only]

- 13 On-Street Facility Types
- Related Off-Street Connectors
- Existing, Planned and Proposed Trails

All maps are available at the Bike Plan Website: http://www.baltimorecity.gov/government/planning/bikeplan.html

ON-STREET NETWORK: STREET AND ROUTE SELECTION

Network Objectives

The overarching objectives of the Network include the following:

a. Achieve thorough geographic coverage of the City;

b. Avoid, if possible, the most heavily traveled and high speed arterials;

c. Provide the best possible safety in traffic;

d. Where possible overcome barriers and street discontinuities; and

e. Ensure that routes meet bicyclist's expectations for continuity, directness, convenience, and linkage with other routes.

[11] Due to the amount of detail in the complete Bicycle Network, Map B cannot be reproduced in 8.5 x 11 format. As a result it is not included in this document. All poster-sized maps can be viewed at the offices of the City Planning or Transportation Department.

Route Selection Criteria

Each of the routes in the network were selected for a reason or set of reasons, based upon what benefits the route provides in terms of bicycle access and transportation, or the degree of difficulty that may be encountered when pursuing improvements to the route. A list of these criteria follows:

- Contribution to providing bicycle access to important destinations, such as commercial districts, shopping areas, employment centers, transit stations, parks, trails, cultural institutions, schools, libraries, etc.;
- Relatively low traffic volumes and speeds, generally comfortable for bicycling without major improvements;
- Existing street (or ROW) width sufficient for making improvements;
- Relative ease with which a bicycle improvement (lane, striping, signing, curb ramp, short connecting path) could be implemented;
- Opportunity for improvement exists because of already scheduled capital improvement project;
- Complements off-road trails to create a unified bicycle travel corridor;
- Topography;
- Advantages the route offers in circumventing barriers such as water, major highways, inaccessible bridges, railroads, large institutions, forests, or steep topography, etc.;
- Connectivity provided to highly isolated neighborhoods;
- Connectivity provided to communities and destinations outside the city;
- Recommended by the bicycling public, or city staff;
- Use of the route by transit buses, trucks and heavy vehicles;
- Presence of unconventional, difficult-to-navigate, or difficult-to-modify intersections along the route;
- Presence of a viable, or better, alternative route that could serve the same destinations and neighborhoods.

Transportation Policy for Bicycle Network Streets

Designating particular streets to be a part of the Bicycle Network is important for the following policy reasons:

1. ***Preservation:*** To ensure that conditions that make the street comfortable, safe and attractive for bicycling are preserved in the routine activities of street maintenance and improvement.
2. ***Identify Opportunities:*** To indicate which streets have significant opportunities to be improved for bicycling and ensure that when the opportunities arise, they are not missed.
3. ***Identify Challenges:*** To indicate which streets are particularly difficult for bicycling, but are needed in the Bicycle Network nonetheless, to provide a comprehensive and continuous system that serves all bicycle transportation needs. To improve these routes special study and design may be necessary to make them suitable for bicycling.

Introductory Bicycle Network -- May 2006
Baltimore Bicycle Master Plan
MAP A
Introductory Bicycle Network Features
Introductory Network (2006-2010)
Introductory Network
Introductory Connections (2006-2010)
Connector
Intersection Improvements Needed
Multi-Use Trails
Completed Paved Tr.
Under Construction or Design
Planned or Proposed
Gravel Trail
0 1 2 Miles
Map Prepared By:

Map A.

Route Implementation Priorities

The on-street routes and connectors are organized into three groups and five priority Tiers, (see below). The primary purpose of prioritizing is to identify the routes that will make up the Introductory Network, to be created in the near term. However, all routes have been assigned a Tier to guide overall plan implementation and funding decisions.

The following criteria were used to set priorities:

1. Relative ease of implementation,
2. Service to popular destinations,
3. Contribution to city-wide coverage,
4. Avoiding significant gaps,
5. Potential to include significant on-street improvements, not just a signed, shared roadway,
6. Not passing up opportunities that may not be available in the future, and
7. Serving a variety of bicycling styles and skill levels.

While ease of implementation played a large role in determining what routes would be selected for Tier One and Two, in some cases, projects of medium complexity were included in Tier One or Two, and some simple routes were slated for later implementation. Thus, each of the Tiers One-Four includes a mix of "easy" and "more complex" projects.

Implementation Phases and Tiers

Introductory Network

Tier One - Top priority routes recommended for implementation in the near term.

Tier Two - Second priority routes recommended for implementation in the near term.

Medium Term Network Additions

Tier Three - Third priority routes recommended for implementation in conjunction with other planned roadway improvements.

Tier Four - Fourth priority routes recommended for implementation in conjunction with other planned roadway improvements

Projects with Variable Timing & Long Term Priorities

Tier Five - Most difficult projects to implement but sometimes provide routes key for a continuous and comprehensive network. Routes are recommended for further study to determine feasibility and implementation as overlap with other planned roadway projects occurs. Project timing will be determined by overall road way improvement needs and CIP scheduling. Most opportunities are likely to occur in 10-20 year timeframe, 2015-2025.

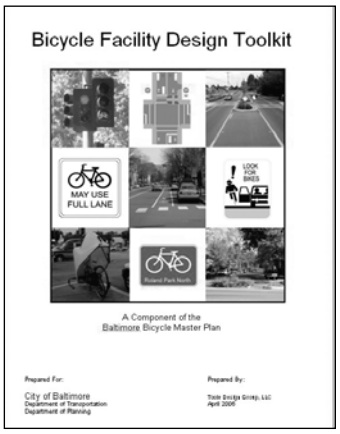
ON-STREET NETWORK: FACILITY TYPES

To facilitate a safe and continuous Network across the wide range of street and road types that exist in the City, a variety of bicycle facilities and accommodations are required. On-street bicycle facilities will include bicycle lanes, shared use pavement markings, wide outside lanes, striped shoulders, signed routes, bicycle safety regulatory and warning signs and a variety of other improvements designed to improve safety and accommodate bicyclists in traffic.[12]

To illustrate these facilities, a Pictorial Glossary, is provided, see pages 26-27. Other facilities are described in the *Bicycle Facility Design Toolkit*, produced in conjunction with this plan. Some of the accommodations described in the *Toolkit* including the following:

- Shared bus/bicycle lanes,
- Approaches for striping streets with peak hour restricted parking,
- Contra-flow bike facilities,
- "Dooring" prevention warning signs,
- Motorist educational signs for new facility installations, and
- Various "share the road" signs.

Replacement of bicycle-unsafe storm water drainage grates and pavement quality are important on-street safety concerns. Details describing bicycle-safe designs are provided in the *Toolkit*.



Facility design toolkit for use by planners, engineers and neighborhoods.

Signed Bicycle Routes

In conjunction with this plan, the City proposes to adopt a Bicycle Route Signing Protocol, which establishes a design framework for providing special wayfinding guidance for bicyclists. Providing the Signed Routes are intended to make the following contribution to the overall Network:

1. Provide a set of spine routes that provide directional guidance, destination and distance information that is easy to follow for all users, including novice bicyclists, new bicycle commuters, new city residents, tourists, and experienced Baltimore bicyclists.
2. Provide routes that touch every part of the city and serve the most important destinations needing bicycle access and wayfinding guidance.
3. Contribute to the physical and visual presence of bicycle facilities on the City street and roadway system, which alerts motorists and all other users of the transportation system that bicyclists have "a right to the road," and are to be expected along these and other routes throughout the City.
4. Provide a discrete, yet citywide feature of the bicycling infrastructure that can be easily mapped and referenced by cyclists and city officials for promotional purposes.

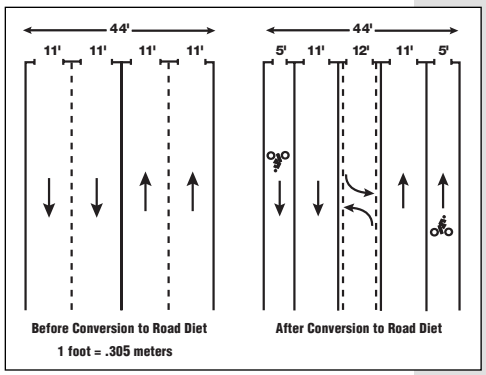
[12] Signing of a bicycle route will depend on the route's need for special wayfinding information. In some cases, on-street bicycle lanes or other markings may be provided on a street that is not a part of a signed route.

Pictorial Glossary of Common Bicycle Facilities

Bike Lane

Bike Box at Intersection

Bike-Friendly Traffic Calming



Lane Reduction (Road Diet)

Different types of facilities will be needed to provide safe and comfortable accommodation for bicycles in the Baltimore City bicycle network. Following is a short list of common bicycle facility types. Specific design guidelines for these and other bicycle facilities are provided in a variety of documents published by AASHTO, SHA, various states and cities and in a *Toolkit* developed as a part of this Plan (see bibliography in Appendix F).

Bike Lane

A bike lane is a portion of the roadway that has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes are always located on both sides of the road (except one way streets), and carry bicyclists in the same direction as adjacent motor vehicle traffic. The standard width for a bicycle lane is 5 feet.

Bike Box at Intersection

Bike boxes are installed to allow bicyclists to move in front of cars waiting at an intersection to increase their visibility and reduce conflicts with turning vehicles. They are typically used at intersections where cyclists need to turn left and/or many vehicles turn right. During a red signal phase, bicyclists are able to better position themselves for a left turn by moving left across the bike box.

Bike-Friendly Traffic Calming

Slowing motor vehicle speeds and limiting motor vehicle access helps improve the on-street bicycling environment. Entry restrictions and narrowing of street widths, while maintaining bicycle access are ways that neighborhood and collector streets can be improved to calm and reduce auto traffic. Bike lanes and shoulders can also calm traffic when outside edge-lines are used to narrow the motor vehicle lanes.

Lane Reduction (Road Diet)

A road diet is the conversion of a four-lane roadway into a two-lane road with bicycle lanes. The new street configuration includes a center turn lane to accommodate left-turn movements without holding up through traffic. Baltimore will have a few key opportunities where there is excess lane capacity that can be recycled. A regular travel lane can also be converted to bike lane on one-way streets that are multi-lane, low volume streets. The extra space can

be used for a greater buffer between curbside parking and the travelways; a center turn lane is not required. In other cities, Road Diets have actually improved through traffic flow and safety, in addition to providing bicycle accommodations.

Shared Roadway

Shared roadways are streets and roads where bicyclists can be served by sharing the travel lanes with motor vehicles. Usually, these are streets with low traffic volumes and/or low motor vehicle speeds, which do not need special bicycle accommodations in order to be bicycle-friendly. Shared roadways can also include streets with wide outside lanes (13 to 14 feet). Increasing the outside lane width increases comfort for bicyclists but can also encourage increased vehicular speeds.

Shared Roadway Pavement Marking "Sharrow"

Motor vehicle/bicycle sharing of the travel space can be emphasized by using special shared roadway pavement markings or *Sharrows. Sharrows* can be helpful on multi-lane streets where there is insufficient space to add bicycle lanes and traffic volumes and/or motor vehicle speeds are at medium levels. In some cases they may be used on two-lane roadways as well. The *Sharrow* marking also assists with wayfinding and can be used in conjunction with signs to delineate specific bicycle routes.

Shared-Use Pathway (Multi-Use Trail)

Shared-use pathways provide a high quality walking and bicycling experience in an environment that provides separation from traffic. Shared-use paths should be a minimum of ten-feet wide and paved. Their width may be reduced to eight feet if there are physical or right-of-way constraints. These types of paths can be constructed within a roadway corridor, in their own corridor (such as a greenway trail or rail-trail), or be a combination of both. On high speed boulevards, there may be a need for shared-use paths in addition to bike lanes. Shared-use paths should not be used to preclude on-road bicycling but rather to supplement a system of on-road bicycle facilities for less experienced cyclists.

Signed Route

A signed route is a continuous set of streets and roads that have been signed to assist bicyclists with wayfinding and/or direct them to particular streets, which generally have better conditions for bicycling. Signed Bike Routes will include signage that provides the bicyclist with frequent distance and destination information. This type of facility may also include bike lanes, *Sharrow* pavement symbols and other bicycle related traffic signs to improve the safety of bicycle operations on the route.

Shared Roadway

Shared Roadway Pavement Marking "Sharrow"

Shared-Use Pathway (Multi-Use Trail)

Signed Route

Bicyclist on Wolfe Street.

Intersection Improvements

Intersections present a particular challenge for bicyclists. Baltimore has some complex intersections that are part of the on-street Network because they cannot be avoided, or creation of a detour would require a major inconvenience for bicyclists, who would be unlikely to use it.

Many of these intersections will require special design considerations. Their unique nature suggests that a wide variety of solutions may be employed, such as the following:

- Bicycle signal heads
- Advance Bicycle Boxes
- Bicycle detection technology to actuate traffic signals
- Adjustment of signal phases and timing
- Special striping patterns
- New curb ramps and crosswalk striping
- Curb extensions
- Changes in one-way street patterns
- Providing for contra-flow bicycle movements
- Providing curb separated travel space on existing or expanded sidewalks
- Signs communicating safety precautions, operational directives and wayfinding.

Intersections are circled in red on the draft introductory and full network maps. Appendix A provides a list of these intersections arranged in priority order consistent with the priority of the route within which it is located.

Off-Street Connectors

Off-street connectors are addressed in the *On-Street Network* section because these linkages are necessary for making the on-street system continuous, safe and convenient.

Off-street connectors, include improvements such as the following: short segments of path or sidewalk, curb ramps, street crossing improvements, railroad crossings, stairway retrofits, mid-block crossings, access to park roads, access across public parking lots, sidewalk designations, underpass rehabilitation, and in some cases new bridge structures to cross streams, railroad tracks or large highways.

Connector Path links new west Baltimore residential neighborhood with Martin Luther King (MLK) Boulevard and downtown.

The connectors identified in the plan were selected because they are necessary for continuity of Network routes, provide bicycle access to transit stations, provide links to/from isolated neighborhoods, connect the Network to key destinations, and/or allow passage across major barriers.

Generally, these improvements are relatively small in nature, and inexpensive. Sometimes they will require simple execution of permits, a couple of signs and special striping. The more costly items include new bridges or major rehabilitation of aging underpass and overpass infrastructure, originally designed with only pedestrians in mind.

Bicycle parking at local college.

Existing and proposed connectors are shown on the introductory and full network maps. Appendix B provides a list by name or location detailing Facility Type, Status (existing/proposed), Priority Tier Designation, and Type of Action Needed.

Bicycle Parking

The *Bicycle Facility Design Toolkit* provides standards for acceptable bicycle parking equipment. It addresses a range of parking types, short term, medium term and long term, and where these types are needed according to typical land use categories. It also provides on-street siting and installation guidance.

OFF-STREET NETWORK

The on-street network is complemented by off street facilities including shared use paths (multi-use trails), and bicycle use of select sidewalks and portions of the Baltimore Waterfront Promenade.

Multi-Use Trails

Trails play a key role in the bicycle transportation system, while doubly serving as recreation facilities. Baltimore's network of stream valley and shoreline trails serve as key routes in the spine system and will allow novice cyclists a less harrowing introduction to bicycle commuting. Following are some keys to ensuring that the trails will serve transportation uses:

- Frequent, bicycle accessible, and well-signed access points connecting to surrounding neighborhoods and crossing streets. The main trails as well, should be well signed with distance and destination information.
- Bicycle lanes or *Sharrows* on roadway sections that connect off-road trail segments, or extend trails to highly used destinations.
- Expansion of the trails system to eliminate gaps, surmount barriers and extend its reach. Phasing should be based on when and where opportunities arise or need is demonstrated, especially related to potential rail-trail conversions.
- Sufficient width (10-15 feet) to ensure safety for both bicyclists and other trail users.

Sidewalks, Sidepaths and Promenades

Generally sidewalks, sidepaths and heavily used pedestrian promenades are not recommended for inclusion in bicycle transportation networks. In fact, throughout Baltimore, a city ordinance makes bicycling on city sidewalks illegal; however, it is very lightly enforced.

Due to limited opportunities and other considerations, in a number of locations this Plan recommends considering use of these facilities for bicycling. Special attention will be required in the design process to ensure user safety.

Sidewalks: Sidewalks may be useful for bicycling for a number of reasons:

- Bicycle access is needed but bicycle volumes and/or pedestrian volumes are expected to be low.
- Right-of-way or traffic safety (high speeds, high volumes, lots of trucks) issues suggest that sidewalk use may be the only option or even preferred.
- They can be designed to accommodate separated, one-way bicycling on each side of the road so that bicyclists can safely and easily transition to and from the road at each end of the segment. Sidewalk bike routes should not result in cyclists riding opposed to motor vehicle traffic when they re-enter the street.

Martin Luther King Boulevard is the primary roadway where sidewalk bicycling should be accommodated, as there is no other direct alternative to use of this corridor.

Typical sidewalk section along Martin Luther King Blvd.

Sidepaths: Sidepaths are essentially trails that are located on the side of a roadway, where a sidewalk normally would be. However sidepaths are often located only on one side of a road and are intended to provide two-way bicycle and pedestrian travel. While this type of facility is not ideal, sometimes it is the only option or even the safest option, for similar reasons as noted above. Sidepaths can function well if some of the following key design features can be achieved:

- The roadway is an expressway, or limited access in nature and the path can be located in an area where there are no, or only a few conflicts with crossing roadways, which may be signalized.
- Crossings of free flow ramps can be avoided, minimized or made sufficiently safe.
- Sufficient width is available to build a facility with a buffer from traffic and path surface wide enough to safely serve the expected volume of bicycle and pedestrian traffic.

A sidepath may be the best facility along Frankfurst, and Hanover streets in south Baltimore, and Hilton Parkway across the Gwynns Falls valley, and in a few other locations.

Promenades: The Baltimore Waterfront Promenade is a special place for outdoor recreation and strolling. Currently bicyclists are allowed on the Inner Harbor section of the Promenade before 10 am. Outer sections of the Promenade on the north side of the harbor, and future outer sections on the south side could be opened to bicycling at all hours, but should be regulated to keep speeds reduced and provide pedestrians the right-of-way. This additional access will serve users who seek an alternative to streets like Boston and Key Highway, or who are traveling to/from waterfront destinations, which include residences, yachts, restaurants, and places of employment.

Usage of the Baltimore Waterfront Promenade varies by time of day and season.

The Executive Summary provided a brief description of the core goals and objectives established by the Plan. Section V, which follows, provides an expanded discussion of the goals and objectives, including specific action recommendations and identification of measurable outcomes.

Goals, Objectives, Recommended Actions and Performance Measures

SECTION V

GOAL 1: Network

DEVELOP A COMPREHENSIVE NETWORK OF FACILITIES FOR BICYCLISTS.

OBJECTIVE 1: Make bicycling safe and inviting on the streets of Baltimore.

Recommendation 1: Implement proposed bicycle route network.

- Install recommended bicycle facilities as outlined in Map C, the Preliminary Facilities map.
- Retrofit unsafe storm water inlet grates and address difficult intersections as routes are implemented.
- Ensure continuity and sufficient access through downtown, to transit stations and across bridges.
- Create a wayfinding system with the proposed signage protocol, to ensure navigability.

Measurable Outcome: *Install the Introductory Network (Figure 4) by 2010, using Motor Vehicle Revenue (MVR), federal TEA funds, and other fiscal means. Install Full Network through road projects.*

Recommendation 2: Improve continuity of on-street network by overcoming negative impact of existing barriers (see Map B and Appendices A and B for lists of intersections and connector paths).

- Allocate MVR funds annually to design safety improvements at complex intersections and construct off-road paths.
- Address barriers created by freeways, railroad lines, industry, large developments, street discontinuity, stream valleys, and one-way streets.

Measurable Outcome: *Identify barriers and address at the same time as design of connecting bicycle routes.*

Recommendation 3: Consider the adopted bicycle route network in prioritizing street resurfacing, reconstruction, and streetscape projects (see maps B and C).

Measurable Outcome: *Implemented street improvements that overlap the Bicycle Route Network and include bicycle accommodations in design.*

Recommendation 4: Coordinate planning, design, and implementation of bicycle facilities with other city plans (see maps B and C).

- Consider bicycle master plan and bicycle facility planning in all roadway reconstruction projects, SNAP plans and other planning endeavors.

Measurable Outcome: *Bicycle accommodations will be included in all city plan documents and discussions.*

Recommendation 5: Coordinate planning, design, and implementation of bicycle improvements near the City line with Baltimore County, Anne Arundel County, Maryland State Highway Administration, and the Baltimore Metropolitan Council (see Map B).

Measurable Outcome: *A regionally continuous bicycle network.*

GOAL 1: Network

OBJECTIVE 2: Increase the availability of bicycle parking and support facilities at destinations across the city.

Recommendation 1: Launch a bicycle parking initiative.

- Install racks at existing destinations, in city retail districts, at all public schools and libraries, and elsewhere along bicycle routes.
- Provide installation by request at existing locations open to the general public.
- Advise employers in providing bicycle parking.
- Adopt policy requiring city government offices to provide bicycle parking.

Measurable Outcome: *Install 100 racks per year.*

Recommendation 2: Require new development to provide bicycle parking.

- Include bicycle parking requirements in Comprehensive Rezoning initiative based on motorized vehicle parking standards.
- Enforce bike parking initiative through Site Plan Review Committee and the Development Guidebook.

Measurable Outcome: *All new development with motorized vehicle parking requirements includes bicycle parking, starting summer 2006.*

Recommendation 3: Improve bicycle parking at transit stations in support of a multi-modal transit system (for list of existing facilities and preliminary needs assessment, see Appendix C).

- Evaluate needs and existing equipment at subway, light rail, MARC, train, and bus transfer stations.

Measurable Outcome: *All transit stations have adequate bicycle parking by 2009.*

High desire for bicycle parking met with poor rack.

Recommendation 4: Develop bicycle commuting/rental centers (*Bikestations*[13]) to provide focal points for bicycle transportation services and promotion.

- Establish Bicycle Stations at: college campuses, high density neighborhoods, major employment centers, major tourist destinations, and transit hubs.
- Develop threshold and standards for commuting centers at government offices.

Measurable Outcome: *Create 3 commuting/rental centers by 2012.*

[13] *Bikestation* is a Registered Trade Mark of the Bikestation Coalition, a 501c (3) organization, www.bikestation.org.

GOAL 1: Network

OBJECTIVE 3: Fully integrate bicycling with all public transit facilities and services.

Recommendation 1: Work with the Maryland Transit Administration (MTA) to accommodate bicycles on all public transit in support of a multi-modal transit system.

- Address bus yard space issues and rack acquisition to allow all busses to be equipped with bicycle racks.
- Create space for bicycles on MARC trains.
- Encourage MTA to host weekend regional bicycle tour promotions.

Measurable Outcome: *Bike racks on all city buses and all types of bicycles permitted on MARC trains by 2008.*

Recommendation 2: Explore the potential for bicycle accommodations on the water taxi.

Measurable Outcome: *Determine issues and address for allowing bicycles on water taxi.*

GOAL 1: Network

OBJECTIVE 4: Develop off-road paths to create a connected trail system.

Recommendation 1: Complete ongoing trail development.

Measurable Outcome: *Complete Jones Falls Trail by 2010. Complete plans for Herring Run and Western Run Greenway by 2008.*

Recommendation 2: Develop new and extend existing trails (for a list of potential trails and extensions, see Appendix D and Map B).

Measurable Outcome: *Identify all possible trails by 2008. Keep at least one trail segment in design and construction each year.*

Recommendation 3: Improve access to trails.

- Install wayfinding signs from neighborhoods and nearby attractions to trails.
- Create solutions to existing physical barriers between neighborhoods and trails.

Measurable Outcome: *All neighborhoods adjacent to trails will have identified access routes to these trails (for these proposed routes, see Map B).*

Trailhead sign provides strong trail branding.

GOAL 2: Education

IMPLEMENT SAFETY, EDUCATION AND ENCOURAGEMENT PROGRAMS TO INCREASE BICYCLE USAGE

OBJECTIVE 1: Improve enforcement of traffic laws related to bicycling.

Recommendation 1: Develop partnership with the Baltimore City Traffic Safety Coalition, Department of Transportation Safety Division, Baltimore City Police Department, and the Mayor's Bicycle Advisory Committee to identify and address bicycle-vehicle safety measures through enforcement and new or amended laws.

Measurable Outcome: *Convene committee and implement recommendations by 2008.*

Recommendation 2: Provide training for Baltimore police officers regarding bicycle safety laws and issues faced by on-street bicyclists.

- Assess existing bicycle training for police officers and address gaps.
- Ensure understanding of bicycles as vehicles, how to determine fault in and document crashes, and bicycle-motorized vehicle interaction.
- Increase number of police on bicycle mounted patrol.

Measurable Outcome: *Police Academy curriculum and ongoing training will include bicycle law and safety information by 2007.*

Recommendation 3: Identify the most common conflicting movements between bicycle and vehicle users and determine enforcement mechanisms to mitigate these conflicts.

- Develop counter measures program including training for officers, public service announcements, engineering, etc.

Measurable Outcome: *Counter measures program developed and implemented by 2009.*

Intersection improvements will increase comfort for bicyclists crossing large thoroughfares.

Recommendation 4: Develop an amendment for the law restricting bicycle riding on sidewalks and the park rule restricting bicycle riding on park paths.

- Convene agency stakeholder group to define legislative recommendations (e.g. 7 mph speed limit on sidewalks, yield to pedestrians, downtown no-sidewalk-riding zone, etc.)

Measurable Outcome: *City parks rule adjustment proposed in 2008. Legislation for sidewalks introduced in 2009.*

GOAL 2: Education

OBJECTIVE 2: Educate the public (motorists, bicyclists, and pedestrians) about bicycle and vehicle operation in urban traffic conditions.

Recommendation 1: Educate existingmotorists and bicyclists about mutual rights and responsibilities (suggested programs listed in Appendix E).

- Create information campaigns to clarify the right and requirement of bicyclists to operate in the street like a motor vehicle.
- Encourage motorists and bicyclists to exhibit respect and to share the road equitably.
- Ensure campaigns are presented in English, Spanish, and other pertinent languages.
- Create safe cycling informational brochure for distribution.

Measurable Outcome: *Launch at least 2 distinct public information campaigns by 2008.*

Recommendation 2: Educate future motorists, bicyclists and pedestrians (ie. children & youth) about safe travel behavior and vehicle operation.

- Support and expand existing safety education programs (Department of Transportation's Safety City, Baltimore City Traffic Safety Coalition, Washington Area Bicyclist Association's safety trailer).
- Encourage greater participation by teachers of students grades 3-5 (bicycle riding age).
- Distribute bicycle helmets, coordinate youth bike rides, and develop age specific brochures to youth education.

Measurable Outcome: *Create brochures and public service announcements. Set specific safety agenda for implementation.*

Recommendation 3: Create and implement Safe Routes to School program.

- Partner with Baltimore City Public School System to increase bicycle safety through sidewalk and street crossing improvements, teaching safe bicycling, and promoting healthier lifestyles.
- Target elementary schools first and then extend to middle and high schools.
- Use new Federal Transportation money dedicated for this activity to fund the program outlined above.

Measurable Outcome: *Physical improvements and school-targeted safety, education and encouragement programs by 2007.*

Bicyclists of today and tomorrow.

GOAL 2: Education

OBJECTIVE 3: Encourage increased bicycling by promoting health, recreation, transportation, and tourist opportunities.

Recommendation 1: Establish partnerships with health organizations to promote bicycling as healthy transportation.

- Address organization and city health goals through joint research, funding requests, and safety and health promotion campaigns.

Measurable Outcome: *With health partner, launch 1-2 efforts to promote bicycling and safety.*

Recommendation 2: Promote bicycling for commuting, errands, socializing, and exercising (for potential programs, see Appendix E)

- Create a program and target higher education, city government and other employers to encourage bicycle commuting to work or school.
- Support recreational bicycle rides.
- Use innovative means to encourage bicycling for errands and socializing (e.g. admission to the Bicycle Movies Series at the Creative Alliance is discounted if you ride to the performance).

Measurable Outcome: *Work with One Less Car to support and expand their employer encouragement program by 2009.*

Recommendation 3: Develop and market a City of Baltimore Bicycle Map.

Measurable Outcome: *Develop Bicycle Map for the internet and seek funding for making print copies available by 2009.*

Recommendation 4: Partner with Baltimore Area Convention and Visitors Association (BACVA) and the Baltimore Office of Promotion and the Arts to promote bicycle opportunities.

- Promote bicycle trails, events, and rental locations via brochures, staff recommendation at visitors center, and on websites.
- Develop a bicycle rental station at the Inner Harbor (possibly at visitors center).
- Encourage hotels to house and distribute bicycle related information.

Measurable Outcome: *Create bike rental station with BACVA by 2008. Develop bicycle information fliers and distribute through BACVA by 2008.*

GOAL 3: Policy

INSTITUTE POLICIES THAT SUPPORT IMPLEMENTATION OF BIKE MASTER PLAN GOALS AND OBJECTIVES WITH COMMUNITY SUPPORT AND INPUT

OBJECTIVE 1: Create structure to implement the Bike Plan goals and objectives.

Recommendation 1: Create a Bicycle Coordinator position in the Department of Transportation to guide and facilitate the implementation of the Bike Master Plan.

- Responsibilities of this position would include, but not be limited to:
  - reviewing street projects for bicycle facilities and network compatibility;
  - reviewing development projects for bicycle parking and access;
  - coordinating safety, education and encouragement programs;
  - staffing Mayor's Bicycle Advisory Committee;
  - developing, with other agency input, city policy and procedure amendments to support Bike Master Plan goals and objectives;
  - coordinating 311 spot improvement program; and
  - managing the implementation of the Bicycle Master Plan and Route Network.
- Position could be partially funded by the Maryland Comprehensive Traffic Safety Program and/or Safe Routes to School.

Families from Baltimore and the region enjoy bicycling on the Gwynns Falls Trail.

Measurable Outcome: *Staff positions, locations, and individuals identified and in place by 2007.*

Recommendation 2: Support Mayor's Bicycle Advisory Committee (MBAC).

- Shift city staffing from Department of Planning to Department of Transportation.
- Diversify membership.
- Update mission statement.

Measurable Outcome: *In 2006, develop list of desired types of members and launch targeted membership drives. The MBAC shall provide an annual report on progress.*

Recommendation 3: Review and update the Bicycle Master Plan every six years.

- Annually identify goals met and broadcast within city government, to the bicycling community and media.

Measurable Outcome: *Regular updates will go to public and government. Formal review of the Bicycle Master Plan will be financially programmed in to FY 2011.*

GOAL 3: Policy

OBJECTIVE 2: Institute new policies and procedures in the Departments of Transportation and Planning to support Bike Master Plan goals.

Recommendation 1: Utilize the following resources to guide bicycle facility planning and design in the Department of Transportation and other agencies: 1) Map C-Preliminary Facility Types, 2) the *Bicycle Facility Design Toolkit*, 3) nationally recognized and accepted bicycle facility design guides (see Appendix F), and 4) Section IV of this plan.

- Update roadway design policies and specifications with information provided in these documents.
- Review and adjust scope, design, and cost estimating specifications of roadway resurfacing, reconstruction, and streetscaping projects to incorporate bicycle facility accommodation.
- Assure all consultant teams hired have sufficient capacity to design bicycle facilities.

Measurable Outcome: *New road projects include bicycle facilities as per information in the identified documents.*

Recommendation 2: Provide sufficient funding through the Capital Improvement Program (CIP) for implementation of independent bicycle improvement projects identified in this plan.

- Establish Introductory Network by 2010 (including design, construction and installation).
- Complete special projects to ensure connectivity (for project lists, see Appendices A, B and D).

Measurable Outcome: *Introductory network and connectivity solutions are completed by 2010 through CIP funding (fiscal years 2007-2009).*

Recommendation 3: Build internal capacity to design and implement bicycle facilities by providing ongoing training for city staff.

Measurable Outcome: *Through 2009, at least one training per year by a recognized bicycle facility design professional shall be conducted for city staff. After 2009, specific training needs will be determined and provided by bicycle coordinator.*

Recommendation 4: Adopt policy requiring new development to mitigate traffic impact by providing bicycle facilities or contributing to a fund which is dedicated for bicycle facilities and improvements.

- Include bike facility development requirement in Development Guidebook and Site Plan Review Committee requirements list.

Measurable Outcome: *Convene committee to determine bicycle facility expectations for Development Guidebook and Site Plan Review Committee and develop calculation for non-compliance fee.*

Recommendation 5: Begin a bicycle data collection program.

- Analyze police crash data to find problems to address with the safety programs.
- Determine basic data points to assist in prioritizing bicycle projects and creating baseline for identifying trends.

Measurable Outcome: *Identify pertinent data points to bicycle safety and facility use. Collect and use to prioritize program and facility implementation.*

GOAL 3: Policy

OBJECTIVE 3: Update street and trail repair and maintenance practices to ensure bicyclists safety and comfort.

Recommendation 1: Develop procedures for maintaining public bicycle facilities.

- Include street and trail sweeping, trimming/clearing vegetation, replacement of bike lane stripes and symbols, inspection and repair of signs.
- Train operation and maintenance crews and supervisors in identifying conditions of concern to bicyclists: small potholes, glass, pavement cracks, overgrown vegetation, improperly installed signs, crumbling curbs, and dangling wires.
- Include bicycle facilities in street sweeping and snow removal strategy.

Measurable Outcome: *Develop maintenance guidelines with visuals and create small version for distribution to maintenance crews by 2008.*

Recommendation 2: Establish bicycle related service request, via the 311 Call Center and online CitiTrack Service Request System.

- Develop system, identify agency and department for addressing specific concerns and create new 311 forms.
- Create category to designate callers as bicyclists.

Measurable Outcome: *Track storm grate inlet retrofit and other bicycle related maintenance requests through 311 by 2009.*

Recommendation 3: Update specifications for routine and emergency street resurfacing and repair to ensure safe traveling routes and surfaces for bicyclists.

- Include bicycle traffic in Maintenance of Traffic plans for all trail and street repairs that interrupt a trail or on-street bicycle route.
- Identify unsafe specifications and update per the design guides recommended herein.
- Assure specifications for road repair prevent pavement break-up, heaving or cracking which create dangerous conditions for bicyclists.

The Gwynns Falls Trail in winter.

Measurable Outcome: *Bicycle facilities are included and protected in ongoing repair projects.*

Implementation

SECTION VI

The City of Baltimore began current efforts to improve bicycling conditions in 1995, with development of the Gwynns Falls Trail. This Plan points the way forward for development of an on-street Bicycle Network focused on accommodating bicycle travel throughout the City for both transportation and recreation. The mission set forth in this plan, is to "promote and facilitate bicycling as a safe, convenient, and comfortable form of transportation and recreation."

In the previous section three basic goals are identified along with objectives and recommended actions:

- **Goal 1:** Develop a comprehensive network of facilities for bicycles.
- **Goal 2:** Implement safety, education and encouragement programs to increase bicycling.
- **Goal 3:** Institute policies that support implementation of Bike Master Plan goals and objectives with community support and input.

In the near term, 2006-2008, funding and implementation resources will be directed toward making the Introductory Network a reality (see Appendix K for details). In addition to installing bicycle facilities on the street network, the City will begin program work in safety education and enforcement, and building city government capacity through training and policy changes.

First and foremost, these initial activities need to increase safety and promote bicycling as an accepted and respected mode of travel within Baltimore. As experience and momentum are gained, more bicyclists take to the streets, and more facilities are installed, approaches will be expanded and a wider range of activities will be embraced.

The goals call for a formal review of the Bicycle Master Plan by 2012. At this point, the City will have made physical accommodations and real progress in adjusting City policy and citizen perspectives on bicycling in Baltimore. The formal review will allow the City to determine what new tactics and accommodations are appropriate, based on the achievements facilitated by this Bicycle Master Plan.

Intersections Where Bicycle Safety Improvements Are Needed

APPENDIX A

The intersections of the following streets in the Introductory Network are locations in need of special consideration and treatments to provide greater safety to bicyclists.

Street 1	Street 2	Street 3	Street 4
Walther Ave	Fleetwood Ave	Northern Pkwy	
Moravia Park Dr	Pulaski Hwy		
Edison Hwy	Sinclair Ln		
Erdman Ave	Macon St		
Sinclair Ln	Parkside Dr		
Belair Rd	Sinclair Ln		
Erdman Ave	Crossland Ave		
33rd St	Hillen Rd	Curran Dr	
Harford Rd	Curran Dr		
Harford Rd	Walther Ave		
Perring Pkwy	Woodbourne Ave	Belvedere Ave	Laurelton Ave
Hamilton Ave	McClean Blvd	Laurelton Ave	
Hillen Rd	Perring Pkwy		
York Rd	Bellona Ave		
York Rd	Old York Rd	Radnor Ave	
Old York Rd	39th St		
Greenmount Ave	36th St	Southway	
Greenmount Ave	Vineyard Ln	Old York Rd	
25th St	Bonaparte Ave		
Guilford Ave	North Ave		
St Paul St	Lanvale St	Mt. Royal Ave	
Guilford Ave	Eager St	Read St	
Charles St	Mt. Vernon Pl		
Eastern Ave	Dundalk Ave	Cornwall St	Drew St
Eastern Ave	895	Mason Lord Dr	
Eastern Ave	Haven St	Lehigh St	
Eastern Ave	Kenwood Ave		
Eastern Ave	Lakewood Ave		
President St	Bank St	Fleet St	Aliceanna St
President St	Pratt St		
President St	Lombard St		
Boston St	Aliceanna St		
Charles St	Redwood St		
Baltimore St	Park Ave	Liberty St	
Fayette St	Hanover St		
Lexington St	Paca St	Eutaw Pl	
Lexington St	MLK, Jr Blvd		

APPENDIX A Intersections Where Bicycle Safety Improvements Are Needed *(continued)*

Street 1	Street 2	Street 3	Street 4
Washington Blvd	Camden St		
Maryland Ave	MLK, Jr Blvd	Park Ave	Preston St
North Ave	Howard St		
North Ave	Park St		
Eutaw Pl	North Ave	Madison Ave	
Eutaw Pl	Madison Ave	Druid Park Lake Dr	
Fulton Ave	Druid Park Lake Dr		
Fulton Ave	Pennsylvania Ave		
Gwynns Falls Pkwy	Swan Dr		
Druid Park Dr	Reisterstown Rd	Park Heights Ave	Sequoia Ave
Liberty Heights Rd	Reisterstown Rd	Gwynns Falls Pkwy	Tioga Pkwy
Gwynns Falls Pkwy	Dukeland St		
Garrison Blvd	Gwynns Falls Pkwy		
Garrison Blvd	Denison St	Windsor Mill Rd	Clifton Ave
Charles St	Maryland Ave	Art Museum Dr	Wyman Park Dr
University Pkwy	St Paul St	Greenway	
Cold Spring Ln	Springarden Dr	Broadview Rd	
Greenspring Ave	Northern Pkwy		
Greenspring Ave	Cross Country Blvd		
Patterson Ave	Reisterstown Rd	Wabash Ave	
Forest Park Ave	Dogwood Rd	Franklintown Rd	
Edmondson Ave	Hilton Pkwy		
Ellicott Drwy	Baltimore St		
O'Donnell St	Newkirk St	I-895	O'Donnell St Cut Off
Boston St	Ponca St	I-895	
Boston St	Haven St		
Key Hwy	Covington St		
Key Hwy	Battery Ave		
Light St	Hughes St	Key Hwy	
Light St	Lee St		
Light St	Conway St		
Potee St	Hanover St	Frankfurst Ave	
Potee St	Hanover St	Reedbird Ave	
Hanover St	Cromwell St	McComas St	Wells St
Shell Rd	Patapsco Ave		
Patapsco Ave	Pennington Ave	Curtis Ave	
Patapsco Ave	Annapolis Rd		
Russell St	Annapolis Rd	Waterview Ave	

Street 1	Street 2	Street 3	Street 4
Washington Blvd	I-95	Hollins Ferry Rd	
Bush St	Bayard St	Russell St	Haines St
Warner St	Ostend St		
Henrietta St	Sharp St		
Russell St	Hamburg St		
Washington Blvd	MLK, Jr Blvd	Russell St	
Washington Blvd	Bayard St		
Frederick Ave	Hurley Ave	Ellicott Drwy	
Wilkens Ave	Dukeland St	Hurley Ave	
Frederick Ave	Hilton Pkwy		
Caton Ave	Joh Ave		
Northern Pkwy	Gist Ave	Jonquil Ave	
MLK, Jr Blvd	Mulberry St	Franklin St	
Kloman St	Waterview Ave		

APPENDIX B

Proposed Connectors

ID	Location/Name	Facility Type	Existing Facility (1) Needed Facility (0)	Tier	Action Needed
11	Ashland St Connector	Path	1	0	None
23	Carrollton Overpass	Overpass	1	0	None
25	Chase St Connector	Path	1	0	None
63	Evesham Playlot Overpass	Overpass	1	0	None
171	Stricker St Overpass	Overpass	1	0	None
47	Druid Hill Pk Connector	Path	0	1	Construct
75	Hopkins Plaza Cut Thru	Ramp or Stair Retrofit	0	1	Construct
87	James St Connector	Path	0	1	Construct
89	Kenwood Connector	Path	0	1	Construct
93	Lakewood Connector	Ramp	0	1	Construct
94	Lakewood Connector	Path	0	1	Construct
101	Lexington Connector	Sidewalk & Xing	0	1	Construct
111	Hopkins Plaza Cut Thru	Ramps or Stair Retrofit	0	1	Construct
136	Park Coonnector	Bike Xings	0	1	Construct
140	Parkside Dr Connector	Path	0	1	Construct
142	Patterson Park Connector	Path	0	1	Construct
157	Pratt St Sidewalk Bike R	Sidewalk	0	1	Construct
165	St. Paul Connector	Sidewalk/Curb Ramp	0	1	Construct
182	Wyman Park Dr Connect	Xing, Curb ramp	0	1	Construct
190	Druid Hill Pk Connector	Path	0	1	Construct
195	Druid Hill Pk Connector	Path	0	1	Construct
197	W Balt MARC Stn	Median Sidewalk	0	1	Construct
207	Inner Harbor Promenade	Waterfront Promenade	0	1	Construct
10	Aliceanna Connector	Sidewalk	1	1	Designate
17	Camden Yd Connector	Path	1	1	Designate
18	Camden Yd Connector	Sidepath	1	1	Designate
19	Camden Yd Connector	Sidepath	1	1	Designate
34	Conway Connector	Sidewalk	1	1	Designate
55	Eastern Ave Connector	Path	1	1	Designate
59	Eutaw St Connector	Bike Access to Prom.	1	1	Designate
73	Hopkins Plaza Cut Thru	Sidewalk	1	1	Designate
74	Hopkins Plaza Cut Thru	Sidewalk	1	1	Designate
76	Pratt St Sidewalk Bike R	Sidewalk	1	1	Designate
82	Inner Harbor Connector	Promenade & Sidewalk	1	1	Designate
86	James St Connector	Sidewalk	1	1	Designate
112	MLK Connector	Sidewalk	1	1	Designate
113	MLK Connector	Sidewalk	1	1	Designate
114	MLK Connector	Sidewalk	1	1	Designate

ID	Location/Name	Facility Type	Existing Facility (1) Needed Facility (0)	Tier	Action Needed
115	MLK Connector	Sidewalk	1	1	Designate
125	North Ave Connector	Sidewalk	1	1	Designate
131	Notre Dame Connector	Parking Access Rd	1	1	Designate
138	Park St Connector	Sidewalk	1	1	Designate
158	Preston Connector	Crossing & Path	1	1	Designate
166	Stadium Connector	Sidewalk	1	1	Designate
167	Stadium Connector	Sidewalk	1	1	Designate
176	W Balt MARC Stn	Sidewalk	1	1	Designate
177	W Balt MARC Stn	Sidewalk	1	1	Designate
178	W Balt MARC Stn	Sidewalk	1	1	Designate
179	W Balt MARC Stn	Sidewalk	1	1	Designate
180	W Balt MARC Stn	Sidewalk	1	1	Designate
193	Eutaw Connector Camden Y	Bike Access to Promenade	1	1	Designate
194	Water St. Connector	Sidewalk	1	1	Designate
198	Inner Harbor Promenade	Waterfront Promenade	1	1	Designate
199	Inner Harbor Promenade	Waterfront Promenade	1	1	Designate
201	Inner Harbor Promenade	Waterfront Promenade	1	1	Designate
202	Inner Harbor Promenade	Waterfront Promenade	1	1	Designate
203	Inner Harbor Promenade	Waterfront Promenade	1	1	Designate
204	Inner Harbor Promenade	Waterfront Promenade	1	1	Designate
205	Inner Harbor Promenade	Waterfront Promenade	1	1	Designate
206	Inner Harbor Promenade	Waterfront Promenade	1	1	Designate
24	Cathedral Sidepath	Sidewalk	1	1	Improve
49	Druid Hill Pk Connector	Path	1	1	Improve
53	Eastern Ave Connector	Sidewalk & Underpass	1	1	Improve
54	Eastern Ave Connector	Sidewalk & Underpass	1	1	Improve
56	Eastern Ave Connector	Sidewalk & Underpass	1	1	Improve
64	Fawn St Connector	Promenade & Median Xing	1	1	Improve
66	Guilford Connector	Path	1	1	Improve
77	Hylton Pkwy Sidepath	Sidepath	1	1	Improve
78	Hylton Pkwy Sidepath	Sidepath	1	1	Improve
96	Leadenhall Connector	Path	1	1	Improve
97	Leadenhall Connector	Path	1	1	Improve
100	Lexington Connector	Xing	1	1	Improve
102	Lexington Connector	Path & Xing	1	1	Improve
103	Lexington Connector	Sidewalk & Xing	1	1	Improve
104	Lexington Connector	Xing	1	1	Improve
105	Light Rail Connector	Sidewalk	1	1	Improve
106	Linden Connector	Crossing	1	1	Improve
107	Linden Connector	Crossing	1	1	Improve
117	Maryland Ave Connector	Sidewalk & Xing	1	1	Improve

ID	Location/Name	Facility Type	Existing Facility (1) Needed Facility (0)	Tier	Action Needed
124	Mt Washinton Connector	Sidewalk and Bridge	1	1	Improve
139	Park St Connector	Sidewalk	1	1	Improve
143	Patterson Park Connector	Path	1	1	Improve
144	Patterson Park Connector	Path	1	1	Improve
145	Patterson Park Connector	Path	1	1	Improve
146	Patterson Park Connector	Path	1	1	Improve
147	Patterson Park Connector	Path	1	1	Improve
12	Baltimore St Connector	Path	1	1	None
13	Baltimore St Connector	Path	1	1	None
15	Bank St Connector	Park Road	1	1	None
16	Bank St Connector	Sidewalk & Xing	1	1	None
33	Cold Spring LRT Access	Ramp	1	1	None
44	Druid Hill Park Path	Path	1	1	None
52	Druid Lake Ring Road	Closed Park Road	1	1	None
91	Lake Drive Trail	Path	1	1	None
92	Lake Drive Trail	Path	1	1	None
116	MLK Xing	At Grade Crossing	1	1	None
135	Paca St Connector	Sidewalk	1	1	None
149	Patterson Park Connector	Path	1	1	None
208	Inner Harbor Promenade	Waterfront Promenade	1	1	None
36	Druid Pk Lk Dr Ctr	Sidepath	0	2	Construct
85	Inner Harbor Promenade	Promenade	0	2	Construct
90	Key Hwy Connector	Path	0	2	Construct
137	Park St Connector	Path	0	2	Construct
26	Chesterfield Connector	Path	0	3	Construct
27	Chesterfield Connector	Path	0	3	Construct
29	Clover Lane Connector	Sidepath	0	3	Construct
31	Cold Spr Stn Connector	At Grade RR Xing	0	3	Construct
32	Cold Spring Connector	Sidepath, Bridge & Xing	0	3	Construct
39	Druid Hill Park Overpass	Overpass	0	3	Construct
40	Druid Hill Park Path	Path & Crossing	0	3	Construct
45	Druid Hill Park Path	Path	0	3	Construct
48	Druid Hill Pk Connector	Sidepath	0	3	Construct
50	Druid Hill Pk Connector	Sidepath	0	3	Construct
51	Druid Hill Xing	Crossing Imp.	0	3	Construct
57	Erdman Xing	Path	0	3	Construct
58	Erdman Xing	Path	0	3	Construct
60	Evesham Connector	Path	0	3	Construct
61	Evesham Connector	Path	0	3	Construct
62	Evesham Connector	Path	0	3	Construct

ID	Location/Name	Facility Type	Existing Facility (1) Needed Facility (0)	Tier	Action Needed
65	Federal Hill Pk Ctr	Path	0	3	Construct
69	Herring Run Connector	Bridge & Path	0	3	Construct
98	Lee Park Connector	Path & Xing	0	3	Construct
99	Lee Park Connector	Path	0	3	Construct
119	Memorial Stadium Connect	Path	0	3	Construct
120	Memorial Stadium Connect	Path	0	3	Construct
121	Middle Br Tr Connecor	Path	0	3	Construct
122	Middle Br Tr Connector	Path	0	3	Construct
123	Montebello Connector	Path	0	3	Construct
126	North Ave Sidepath	Sidepath	0	3	Construct
127	North Ave Sidepath	Sidepath	0	3	Construct
128	Northern Pkwy Connector	Path	0	3	Construct
129	Northern Pkwy Connector	Path	0	3	Construct
132	Notre Dame Connector	Path	0	3	Construct
134	Ostend St Connector	At Grade RR Crossing	0	3	Construct
141	Parkside Dr Connector	Path	0	3	Construct
152	Patterson Park Connector	Path	0	3	Construct
153	Powder Mill Pk Connector	Path	0	3	Construct
155	Power Line ROW	Path	0	3	Construct
156	Power Line ROW	Path	0	3	Construct
159	Reisterstown Stn Conn	Path	0	3	Construct
160	Reisterstown Stn Conn	Path	0	3	Construct
161	Resevoir Connector	Path	0	3	Construct
164	Chesterfield Connector	Path	0	3	Construct
169	Stockholm St Connector	Trail with Rail	0	3	Construct
174	Towanda Connector	Path	0	3	Construct
175	Towanda Connector	Path	0	3	Construct
183	Western Run Connector	Path	0	3	Construct
185	Western Run Connector	Path & Bridge	0	3	Construct
186	Wilmarco Connector	Path	0	3	Construct
187	Wyman Pk Dr Connector	Path	0	3	Construct
189	Balt Com College Connect	RR Xing	0	3	Construct
192	Coppin St Connector	Path	0	3	Construct
196	W Balt MARC Stn	Midblock Crossing	0	3	Construct
1	28th St Overpass	Sidewalk/Overpass	1	3	Designate
3	29th St Overpass	Sidewalk/Overpass	1	3	Designate
5	29th St Overpass	Sidewalk/Overpass	1	3	Designate
6	29th St Overpass	Sidewalk/Overpass	1	3	Designate
7	29th St Overpass	Sidewalk/Overpass	1	3	Designate
8	29th St Overpass	Sidewalk/Overpass	1	3	Designate
9	29th St Overpass	Sidewalk/Overpass	1	3	Designate

ID	Location/Name	Facility Type	Existing Facility (1) Needed Facility (0)	Tier	Action Needed
30	Clover Lane Connector	Sidepath	1	3	Designate
184	Western Run Connector	Sidewalk	1	3	Designate
191	Coppin St Connector	Path	1	3	Designate
0	Melrose Ave Footbridge	Bridge	1	3	Improve
2	28th St Overpass	Overpass	1	3	Improve
4	29th St Overpass	Sidewalk/Overpass	1	3	Improve
20	Carroll Park Connector	Path	1	3	Improve
21	Carroll Park Connector	Path	1	3	Improve
35	Druid Pk Lk Dr Ctr	Sidepath	1	3	Improve
37	Druid Pk Lk Dr Ctr	Sidepath	1	3	Improve
38	Druid Pk Lk Dr Ctr	Sidepath	1	3	Improve
41	Druid Hill Park Path	Path	1	3	Improve
42	Druid Hill Park Path	Path	1	3	Improve
43	Druid Hill Park Path	Path	1	3	Improve
79	I-95 Overpass	Path and Ramp	1	3	Improve
80	I-95 Overpass	Overpass	1	3	Improve
81	I-95 Overpass	Overpass	1	3	Improve
148	Patterson Park Connector	Path	1	3	Improve
150	Patterson Park Connector	Path	1	3	Improve
151	Patterson Park Connector	Path	1	3	Improve
154	Power Line ROW	Path	1	3	Improve
163	Sharp St Connector	Path	1	3	Improve
170	Stricker St Connector	Paved Closed Street	1	3	Improve
173	Towanda Connector	Path	1	3	Improve
200	Inner Harbor Promenade	Waterfront Promenade	1	3	Improve
46	Druid Hill Park Road	Closed Park Road	1	4	Designate
14	Bank St Connector	Path & Overpass	0	5	Construct
22	Carroll Park Connector	Path	0	5	Construct
28	Chesterfield Connector	Path	0	5	Construct
83	Inner Harbor Promenade	Promenade	0	5	Construct
84	Inner Harbor Promenade	Promenade	0	5	Construct
88	Kane St Connector	Rail-Trail & Overpass	0	5	Construct
118	Masonville Cove Conn.	Path and Xing	0	5	Construct
172	Stricker/Carroll Pk Ctr	Path, At Grade RR Xing	0	5	Construct
181	W Frederick Connector	Sidepath	0	5	Construct
68	Herkimer St Connector	Path	0	6	?
168	Stafford St Connector	Path	0	6	?
188	Hanover St Connector	Sidewalk	0	6	?

List of Transit Stations: Existing Facilities and Preliminary Needs Assessment

APPENDIX C

During the planning process the MTA provided information about its bicycle parking facilities at rail stations. A count of the lockers and racks that are installed and usable at each station was not provided. Below is a list of the stations that have lockers, racks or both, as well as those stations that will likely need bicycle parking equipment in the near term.

In general, racks and lockers are most useful for the outlying transit stations, where the bicycle can be used to get between the station and home. However, with increasing numbers of people living in and near the heart of the city, and job locations that may require reverse commutes, some downtown stations should also provide bicycle parking. In addition to parking a number of transit stations need access improvements to make it easier to get to the station by bicycle.

Transit Station	Has Lockers	Has Racks	Needs Lockers or Racks	Needs Improved Access
Light Rail				
Mt. Washington		x	x	x
Cold Spring			x	x
Woodberry			x	x
North Avenue		x	x	x
Mt. Royal		x	x	x
Westport			x	
Cherry Hill		x	x	
Patapsco		x	x	
Metro				
Reisterstown Plaza	x	x		x
Rogers Ave	x	x		
West Cold Spring	x	x		x
Mondawmin	x		x	x
Penn North			x	
Upton			x	
State Center			x	
Shot Tower Marketplace			x	
Johns Hopkins Medical Center			x	
MARC				
Camden Station		x	x	x
Penn Station		x	x	x
West Baltimore Station			x	x

APPENDIX D

Potential Trails and Extensions

- Western Run
- Catonsville Short Line (West of Caton Avenue): Frederick Ave to City Line
- Gwynns Falls Parkway (Gwynns Falls Trail offshoot): Clifton to Franklintown Road
- Wetheredsville Road (Gwynns Falls Trail offshoot): Windsor Mill Road to Pickwick Road
- Western Maryland Rail Trail: Liberty Heights Avenue (West of Mondawmin Mall) to Carver Vocational-Technical High School
- Clifton Park Connector: 25th Street and Harford Road to Erdman Avenue and Norman Avenue
- BGE Transmission Line Trail (East of Sinclair Lane and Cold Spring Lane): Bowley's Lane to City Line
- East Baltimore Rail Trail (N-S Trail, East of Haven Street): Monument Street to Boston Street
- Franklin and Mulberry Trails (West Baltimore): Fremont Avenue to Fulton Avenue
- Stoney Run
- Gwynns Falls Trail offshoots in Cherry Hill (East of Annapolis Road, West of Patapsco River) to Light Rail station, Cherry Hill Park and City Line
- Herring Run Trail - Northern extension to Lake Montebello, Morgan State University and City Line
- Herring Run Trail - Southern extension to Armistead Gardens, add bridge over street to connect Federal Street with Bowley's Lane
- Harbor and Middle Branch - extend bicycle and pedestrian path along shore

Safety, Education and Encouragement Program Ideas

APPENDIX E

- Establish a bicycle commuting mentor/accompaniment program.
- Use the mass media (radio, tv, outdoor advertising) for a bicycle safety campaign.
- Create bumper stickers: "Share the Road, Hon," or "Believe in Bicycling."
- Distribute existing bicycle safety brochures developed by MDOT.
- Develop pollution reduction by biking brochure for distribution at DMV offices and emissions inspection stations.
- Develop a laminated card for bicyclists to give to drivers who don't show respect.
- Provide sensitivity training to bus drivers about sharing the streets with bicyclists.
- Get question about bicycle laws and safe interaction on the state driver's license test.
- Coordinate educational efforts through the Hispanic Liaison Office to ensure that the Latino population is reached with bicycle safety messages.
- Ask the radio and TV traffic reporting organizations to include information useful to bicycle commuters.
- Establish a citizen/volunteer bike patrol to keep watch over city bike routes and trails.
- Educate the teachers in driving schools.
- Expand city rideshare program to include bicycling incentives and encouragement.
- Develop incentive program for city employees who ride/walk/take public transit to work regularly.
- Ensure that regular bicycle riding safety and skill classes are available at low cost.
- Safe Routes to School Program.
- Outreach to all communities and faiths.
- Make bike helmets "cool."
- Ravens/Orioles advertising encouraging people to ride.
- Valet bike parking.
- Use traffic reports for bicycle public service announcements.
- Tax breaks for businesses where employees ride to work.
- Live where you work campaign.

- Bicycle rehab cooperative: reuse old bicycles, train youth in bicycle repair.
- Create bicycle hotline, website, email exchange; include good and safe routes information, general safety information.
- In media campaigns, include economic and public health benefits of bicycling.
- Driver retraining to share the road (beyond driver's test question): signs, ad campaigns, etc.
- Mass public media education campaign on car/biking etiquette.
- Art bikes at Artscape.
- Tax breaks to buy bikes associated with back to school.
- Create fine for vehicles parked in bicycle lanes.
- Establish Baltimore Bicycle Community Project Fund (for neighborhood events, trail watch, maintenance, clean-up projects, after-school programs, special information signs along routes).
- Focus education for bicyclists on proper lane position, night lighting and signaling.
- Focus education for drivers on proper passing (speed and margin).
- Arrest and prosecute motorists who harass cyclists.
- Start Baltimore specific independent bicycle advocacy organization.
- Develop personal safety program (protection from crime and assault).
- Target bicycle routes for increased law enforcement.
- *Cyclovia-Bogota* program in Colombia (South America) which closes miles of streets each Sunday to motorized vehicle traffic—streets become pedestrian and bicyclist space for Sunday errands and outdoor activities.

Bibliography of Bicycle Facility Design Guidelines

APPENDIX F

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APPENDIX G

Complete Survey Results

326 people completed all or a portion of this survey. Blank answers for any particular question are not represented thus any raw numbers may not necessarily add up to 326. Percentages are calculated using the total number of respondents to that particular question, unless otherwise noted.U.S. Department of Transportation, Federal Highway Administration. *"Manual on Uniform Traffic Control Devices."* Washington, D.C.: U.S. DOT, FHWA, 2003.

1. Based on your experience, which Baltimore streets are best for bicycling?

Street	Mentions	Street	Mentions	Street	Mentions
33rd St	3	36th St	2	Baltimore St	3
Bank St	7	Boston St	6	Broadway	3
Calvert St	2	Charles St	11	Eastern Ave	2
Edmondson Ave	2	Eutaw Pl	2	Falls Rd	21
Fleet St	2	Fort Ave	7	Frederick Ave	2
Gough St	7	Greenmount Ave	2	Greenway	2
Guilford Ave	8	Gwynns Falls Pkwy	2	Harbor Promenade	2
Harlem Ave	2	Hillen Rd	2	Hollins St	2
Hudson St	3	Key Hwy	3	Lake Ave	4
Lake Montebello	2	Light St	5	Loch Raven Blvd	2
Maryland Ave	6	Mount Royal Ave	2	Northern Pkwy	2
Park Ave	4	Pratt St	11	Roland Ave	9
St. Paul St	6	University Pkwy	3	Walther Ave	3
York Rd	2				

2. Which Baltimore streets are worst for bicycling?

Street	Mentions	Street	Mentions	Street	Mentions
33rd St	6	All	27	Baltimore St	2
Belair Rd	3	Boston St	3	Broadway	2
Calvert St	8	Charles St	17	Cold Spring Ln	2
Downtown	4	Eastern Ave	2	Falls Rd	10
Fayette St	4	Fleet St	5	Fort Ave	3
Frederick St	2	Fulton Ave	2	Greenmount Ave	4
Gwynns Falls Pkwy	2	Hanover St	4	Harford Rd	4
Howard St	6	Liberty Heights Ave	3	Light St	11
Lombard St	4	Madison St	3	MLK Blvd	4
Monument St	2	North Ave	3	Northern Pkwy	3
Orleans St	3	Potee St	2	Pratt St	16
President St	2	Roland Ave	2	St. Paul St	14
University Phwy	2	Washington St	2	Wolfe St	6
York Rd	11				

3. What are the best off-street routes (paved trails or sidewalks) in Baltimore?

Route	Mentions	Route	Mentions	Route	Mentions
B & A Trail	4	Falls Road	5	Fort McHenry	2
Gwynns Falls Trail	4	Promenade	5	Lake Montebello	2
NCR Trail	3	Thomas Ave	2		

4. What are the worst off-street routes (paved trails or sidewalks) in Baltimore?

Route	Mentions	Route	Mentions	Route	Mentions
Calvert St	2	Downtown	4	Druid Hill Park	2
Jones Falls Trail	12	Fayette St	2	Federal Hill Park	2
Fells Point	3	Franklin Square Park	2	Hanover Street/Bridge	2
Herring Run Trail	4	Promenade or Trolley Lane	10	Lake Montebello	2
Lake Roland	2	Patterson Park	2	Pratt St	4
Sidewalks	5	Wyman Park Dr	2		

5. On which streets would you like to see bicycle lanes or other bicycle facilities?

Street	Mentions	Street	Mentions	Street	Mentions
25th St	3	33rd St	9	Aliceanna St	5
All	14	Boston St	4	Broadway	2
Calvert St	10	Charles St	18	Cold Spring Ln	2
Eastern Ave	3	Edmondson Ave	2	Falls Rd	8
Fayette St	2	Fleet St	5	Fort Ave	3
Frederick Ave	2	Greenmount Ave	2	Guilford Ave	3
Gwynns Falls Pkwy	2	Hanover St	4	Harford Rd	2
Hillen Rd	2	Howard St	3	Keswick Rd	2
Key Hwy	3	Liberty Rd	2	Light St	5
Lombard St	5	MLK Blvd	3	Maryland Ave	3
Monument St	2	North Ave	3	Northern Pkwy	5
Orleans St	4	Pratt St	17	President St	2
Roland Ave	3	St. Paul St	16	Washington St	2
Wolfe St	2	York Rd	6		

6. *At which locations would you like to see additional bicycle parking (racks or lockers) provided? (Provide a neighborhood, address, intersection or business name.)*

Location	Mentions	Location	Mentions
36th Street/Hampden	7	Parks	2
Schools	2	Markets/Grocery Stores	6
Broadway	3	Camden Yards	4
Canton	8	Charles (Mt. Royal to 33rd)	6
City Offices	4	Courthouse	2
Cross St Market	3	Downtown	7
Eastern Ave	2	Fells Point	4
Gallery Place	2	Harbor	9
Hopkins Hospital	6	Korean Memorial	2
Light St	2	Light Rail	2
MICA	2	Mt. Vernon	3
Poly/Western	2	Pratt St	3
South side	2	Thames St	2
UMB	3	Waverly	4

7. *What was the primary purpose of your last bicycle trip?*

(Please circle only ONE reason.)

Reason	Mentions	Percent of Total Responses
Travel to work	104	37%
For exercise / recreational activity	99	35%
Personal business / errands	31	11%
Visit friends / social / entertainment	15	5%
Travel to school	9	3%
Travel to subway / light rail / bus	3	1%
Travel to carpool / vanpool	0	0%
Other	23	8%

All "Other" Answers provided:

All of the above.
All purpose, no other mode of transportation.
All travel.
Bike Messenger.
Checking out potential bike commute (to work). Haven't taken the job yet.
Don't know how to drive.
Errands, visit, exercise.
Go to school.

I have just moved to Baltimore and I'm living downtown, and as yet have to get a bike - but I believe bike lanes and paths are truely important. You might want to look at the Twin City, MN as an example.

I ride to Penn Station M-Fri for the MARC line.

Just enjoy Baltimore.

Just riding.

Our family likes to use our bicycles as transportation.

Shopping at Galleria mall.

To come to Bike Master Plan Meeting.

To take a walk.

Today's event, my first time.

Touring and ride to Bike Jam.

Travel to MARC train.

Travel to train station/for exercise.

Travel to work, errands and exercise.

Travel to work, personal business/errands and visit friends.

Who the hell knows. It's freezing out, I haven't been on my bike since November. I do like to use My bike to go from my house in Locust Point to the farmer's market. I also use my bike to go to the library and hair stylist on Light Street. Sometimes I like to ride to Fells Point.

8. *Which of the following factors plays a role in whether or not you ride your bike to your destination? (Circle as many as apply.)*

Factors	Yes Responses
Safety of travel route for bicyclists	75%
Weather	59%
Traffic	53%
Need for exercise	39%
Travel time	38%
Availability of bicycle parking	30%
Availability of showers/changing facilities	21%
Hills	17%
Other (please explain)	17%
Costs of other travel modes	11%
"Other" Answers provided:	

Alcohol consumption.

Safety and availability of bike parking.

Ability to combine bike route with public transportation.

Ability to take bike inside.

Always ride: only form of transportation.

Are bicycles allowed on city sidewalks. I would like to ride with my two sons N. on MLK from Hollins Market to Bolton Hill, but I am worried about safety with the 6-year-old. The sidewalks seem safest, but I thought legally bikes were supposed to drive in the traffic lanes.

Availability of car parking

Bicycle maintenance in the area

Condition of roads sewer grates

Condition of street. A part of 'Safety of travel route', but also a distinct category. This is the BIGGEST problem I see in Baltimore - absolutely terrible streets for biking.

Crappy public transportation

Distance

Do not own car

Grossness of sidewalk or neighborhood -- is it a pretty trail, or are you sucking in exhaust?

Helping the environment, as everyone driving all of the time is not sustainable

I absolutely refuse to pay exhorbitant prices to park my car at the Inner Harbor. Also, the Balt City meter maids have the enthusiasm of a pit bull. I'd much rather walk or ride my bike safely to where I need to go, than deal with a multitude of court dates.

I always bike, rain or shine. Buses aren't reliable.

I ride as my main mode of transportation. Traffic, safety of the street does not stop me, but affects the stress level in riding. I take the bus in snow or very bad rain.

I want to make sure that my bike is safe. The last time I went riding, and me and my boyfriend stopped at the Inner Harbor to get a smoothie. We locked the bikes up well, but when we got back, we had a wheel stolen and several other items were missing from other bikes. It's a shame to see that happen in a very touristy section in the middle of the day.

If I need to go somewhere, I ride

If its night and neighborhoods aren't safe, I will drive if I don't have a biking partner.

Less polluting

MARC allowing me to take my folding bike on the train easily. Now a bulky, non-biker friendly case required! Not practical.

Metro schedule

Mood (I love to ride)

Need to carry supplies to work.

Neighborhood safety

No factors - bicycle is exclusive transportation

None, always bike

Parking safety

Perceived safety from assault or other crimes.

Places to park

Poor condition of streets

Pot holes all over the place....roads are so bad they will bend the wheel frame that is why messenger services ride there bikes on the sidewalk and endanger people

Pot holes and parked cars

Proximity of bicycle-accessible 'needs;' for example, if there were more REAL retail in the city (i.e. BestBuy, Gap, etc.) I would consider riding to it from my neighborhood.

Safety and weather are top of list

Safety of being a female alone in this city

Safety of bike while in it's locked up

Safety safety safety safety! Darkness in the winter

Security of bicycle parking

Security of bike. I have a really nice bike.

Smooth roads with few potholes and storm grates that are cyclist friendly.

TIme of day - Becouse I am forced to take a lane for safety I try to get into work by 7 am - later in the am I avoid biking becouse of the anger factor of car commuters and trucks - In the evenings I try to leave at same time so my fellow commuters are used to seeing me and have learned to live with a bike commuter.

Time of day (darkness).

Tourist.

Transport of work clothes.

Viable options - outfit more MTA buses with bike racks on the front - it seems only one in ten has them. Expand (AND MAKE IT LOGICAL!) the Subway and Light Rail systems to the East/West, not just Owings Mills/Lutherville to south.

9. *When making a bicycle trip, which of the following do you prefer to use? (Circle only ONE.)*

Bike lanes	43%
On-street	31%
Off-street paved trails	19%
Sidewalks	7%

10. *How many days during the last week did you use the following forms of transportation? (Circle as many as apply.)*

Transportation Mode	Average Number of Days
Drive	5.74
Walk	4.33
Bicycle	2.94
Subway/Lightrail	.84

11. *Did you take your bike on the following modes of public transportation in the last week?*

Transportation Mode	Yes	No
Bus	11	273
Subway/Lightrail	14	267

12. *If you have been involved in a crash while riding your bike in the City of Baltimore, please answer the following two questions.*

Total respondents to any portion of the crash question: 97

Percentage of all survey respondents reporting involvement in a crash: 30%

12a. Please indicate who else was involved in the crash. (Circle as many as apply.)

Involved	Percent
Motorist	55%
Bicyclist	10%
Pedestrian	8%
Other Cause (i.e. slippery surface, uneven pavement, etc)	56%

12b. On what type of facility did the crash occur?

Location	Percent
Street	92%
Sidewalk	5%
Trail	3%

13. Which of the following factors do you think would do the most to encourage bicycling in the City of Baltimore? (Circle only ONE.)

Factors	Yes Responses
Build bikeways	59%
Enforce laws applying to motorists	6%
Provide bicycle storage	5%
Safety outreach and education	4%
Reduce street traffic	3%
Enforce laws applying to bicyclists	2%
Increase police protection	2%
All	11%
Don't know	1%
Other	8%

14. What is the closest street intersection to your home?

(Results shown as city or state of residence only.)

Baltimore City residents	84%
Other Maryland residents	14%
Out-of-state (Washington DC & Illinois)	1%

15. What is your gender?

Male	59%
Female	41%

Baltimore Bicycle Master Plan Survey

The City of Baltimore is undertaking a comprehensive bicycle master plan project. We want to know how we can make your trip safer and more convenient by bike. Please help us by answering the following questions. Return to: Bike Master Plan; 417 E Fayette St, 8th Floor; Baltimore, MD 21202.

1. Based on your experience, which Baltimore streets are best for bicycling? (Be as specific as possible about location, for example: Roland Ave, between Lake Ave and Northern Pkwy.)

2. Which Baltimore streets are worst for bicycling?

3. What are the best off-street routes (paved trails or sidewalks) in Baltimore?

4. What are the worst off-street routes (paved trails or sidewalks) in Baltimore?

5. On which streets would you like to see bicycle lanes or other bicycle facilities?

9. At which locations would you like to see additional bicycle parking (racks or lockers) provided? (Provide a neighborhood, address, intersection or business name.)

7. What was the primary purpose of your last bicycle trip? *(Please circle only ONE reason.)*

    a. travel to work
    b. travel to school
    c. personal business /errands
    d. visit friend/social/entertainment
    e. travel to metrorail / metrobus
    f. travel to carpool / vanpool
    g. rode for exercise/recreational activity
    h. other (please explain)_____

8. Which of the following factors plays a role in whether or not you ride your bike to your destination? *(Circle as many as apply.)*

    a. travel time
    b. availability of bicycle parking
    c. safety of travel route for bicyclists
    d. traffic
    e. costs of other travel modes
    f. need for exercise
    g. availability of showers/changing facilities
    h. weather
    i. hills
    j. other (please explain)_____

9. When making a bicycle trip, which of the following do you prefer to use? (Circle only ONE)
    a. On-street
    b. Bike lanes
    c. Sidewalks
    d. Off-street paved trails

10. How many days during the last week did you use the following forms of transportation? (Check as many as apply.)
    a. Bus _____days
    b. Subway/Lightrail ____days
    c. Bicycle_____days
    d. Walk _____days
    e. Drive _____days

11. Did you take your bike on the following modes of public transportation in the last week?
    a. Lightrail ____yes____no
    b. Bus____yes____no

12. If you have been involved in a crash while riding your bike in the City of Baltimore, please answer the following two questions.

12a. Please indicate who else was involved in the crash (Circle as many as apply.)
    a. Motorist
    b. Bicyclist
    c. Pedestrian
    d. Other cause (i.e. slippery surface, uneven pavement, etc.)

12b. On what type of facility did the crash occur?
    a. Street
    b. Sidewalk
    c. Trail

13. Which of the following factors do you think would do the most to encourage bicycling in the City of Baltimore? (Circle only ONE.)
    a. Build bikeways
    b. Safety outreach and education
    c. Enforce laws applying to bicyclists
    d. Enforce laws applying to motorists

e. Reduce street traffic

f. Increase police protection

g. Provide bicycle storage

h. Nothing

i. All

j. Don't know

k. Other (please specify)

14. What is the closest street intersection to your home? (If you live outside the City of Baltimore, please indicate your jurisdiction.)

15. What is your age?

16. What is your gender?

b. ____M

c. ____F

Thank you for helping with the Baltimore Bike Plan!

If you want to be contacted for the public meetings related to the plan, please fill out this portion:

Name:_____

Address:_____

_____

E-Mail Address:_____

(WRITE NEATLY PLEASE!!)

APPENDIX I

Estimated Mileage of Preliminary Facility Types (Map C)

The Proposed Network totals approximately 417 miles (centerline miles).

- 111 miles - Tier 1
- 46 miles - Tier 2
- 58 miles - Tier 3
- 119 miles - Tier 4
- 83 miles - Tier 5

A preliminary facility type (85 percent confidence rate) was identified for a total of approximately 150 miles. An additional 90 plus miles of roadway was found to be generally suitable for shared use, or no better facility option was possible.

Due to their complexity, preliminary facility recommendations could not be made for 29 miles of the roadway.

GIS Code	Tier 1 Mileage	Tier 1-5 Mileage	Facility Type	Design Concept/Rationale
2	26.1	45.5	Bike Lanes - Traditional	Space exists for two 4.5 - 5 ft bike lanes.
3	38.5	54.7	Sharrow	Continuity is needed; not enough space for bike lanes; emphasize road sharing.
4	12.4	25.6	One-Way Bike Lane	Single bike lane paired with bike lane on a parallel one-way street.
5	2.2	5.7	Contra Flow Section	Use signs or formal lane, may use sharrow in one or both directions.
6	0.0	1.0	Striped Shoulders	Less than bike lane width, curbless roadway.
7	71.6	93.1	Shared Roadway	No special treatment.
8	2.4	3.5	One Way Shared Road	One-way road, no special treatment.
9	5.3	7.6	Wide Outside Lanes	13-15 feet
10	2.7	3.6	Sidepath	Minimum 8' in very low volume situations; 10-12' recommended; minimum 2' buffer to curb
11	1.9	5.4	Bike-on Sidewalk Pairs	Minimum 6' sidewalks on each side; 8' recommended plus a tree lawn.

GIS Code	Tier 1 Mileage	Tier 1-5 Mileage	Facility Type	Design Concept/Rationale
16	0.0	0.3	One Way Sidewalk	Used for route continuity where there is minimal bike or pedestrian volumes.
17	0.0	0.3	Shared Bike/Bus Lane	Bus or shuttle lanes or loading zones exist; no room for bike lane.
18	1.4	2.0	Shared Peak-Hour Restricted Parking Lane	Bikes use left or right side of peak-hour restricted parking lane.
19	1.4	1.4	Sharrow on One Side, Bike Lane on the Other Side	Hilly roads without sufficient room for two bike lanes.

APPENDIX J

Advanced Bicycle Accommodations for Future Consideration

The following approaches to bicycle accommodations were proposed during the course of the plan. These approaches are generally used in communities with well-developed bicycle networks and high levels of bicycle use. A number of these ideas have been successfully implemented in European cities.

1. Bicycle Boulevards - These are created by using through neighborhood streets, which parallel busier arterials, as the designated bike route. These streets usually have less traffic, and are retrofitted to further calm traffic and give priority to bicycle travel through design and operational controls. A number of "side-street" routes are proposed in the Plan, without recommendations for physical traffic calming and controls which is more costly and requires extensive coordination with local residents. However, these facilities may be quite applicable in future years as the network is more fully developed.

2. Use the Northern European model of creating bike lanes curb separated from the roadway as well as separated from sidewalk. This design approach is not applicable on streets with curbside parking, which is typical in Baltimore.

3. Brand bike lanes by using special colors or symbols to treat the roadway surface between the white stripes. This approach may be very useful in the future, however it adds cost to facility implementation.

4. Provide self-service bicycle rentals where bicycles are locked to special equipment that is located in public places can be released by use of a credit card, used and returned. A fee is charged. A uniform, mass-produced bicycle is typically offered. Theft or vandalism could be a problem with such systems. While successfully used in Europe, they have not yet been successfully piloted in the US.

5. Establish "Car-free Zones" in downtown areas, or other areas where bicycle and pedestrian use is high and needs to be encouraged.

6. Take a more aggressive approach to providing bicycle parking equipment and space by reducing motor vehicle parking and replacing it with bicycle parking. For example, replace 1 of every 100 motor vehicle parking spaces with bike parking.

7. Develop neighborhood bicycle routes.

8. Provide outdoor information kiosks with bike route maps at key places throughout the city, or along a bike route. This is already being done along the Gwynns Falls Trail. Once a significant amount of the route system is in place, outdoor maps may be very helpful.

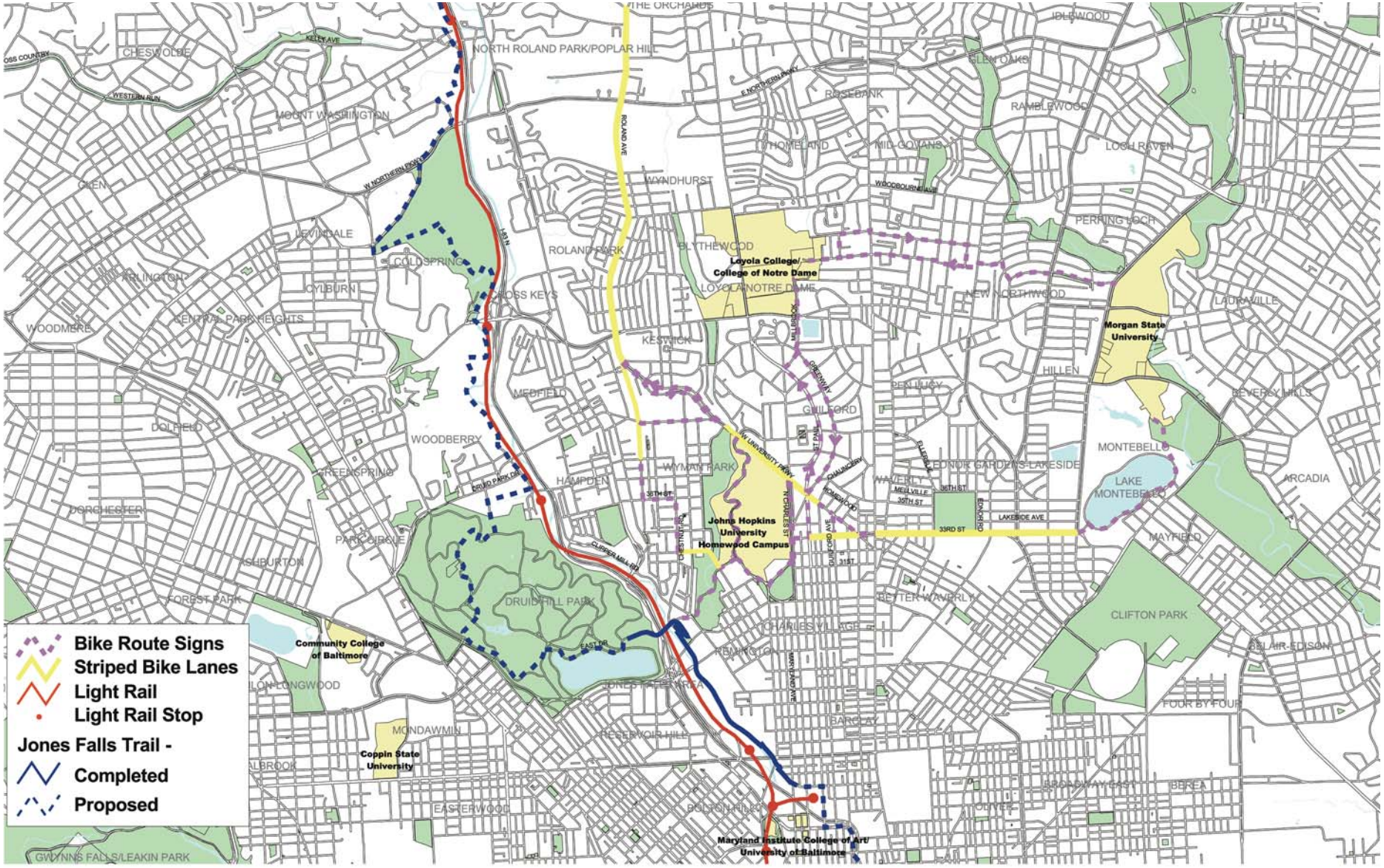
Introductory Network Installation Capital Budget Request

APPENDIX K

FY 2007 - FY 2009	**Total Budget:**	**$3,525,000**
Year 1: Facility Improvements (Design and Construction)	**Responsibility**	**Cost**
Install Early Action Project, Collegetown Bike Route, and associated facilities, including signs and pavement markings. $85,000 from Federal CMAQ Funds, $175,000 from Transportation MVR or other Capital funds.	Transportation	$175,000
2 Major Improvements: Engineering and Design of accommodations in Hopkins and Charles Plaza; Redwood and Water Street re-configuration.	Transportation	$60,000
Small infrastructure improvements including bicycle parking, storm water grate improvements, intersection improvements, mid-block crossings, short paths, curb ramps, or stairway retrofits. (Budget includes E & D costs.)	Transportation	$285,000
On-call consultant to provide in-house design, engineering, planning and related services to the Traffic Engineering Division. Design for 2/3 of Introductory Network.	Transportation	$175,000
	Total Year 1 Cost:	**$695,000**
Year 2: Facility Improvements (Design and Construction)	**Responsibility**	**Cost**
Install designed portion of Introductory Network (approx. 110 miles of bicycle lanes, other pavement markings, or signed bike routes). $15,000 per mile for est. 30 miles of street markings; $7,000 per mile for est. 70 miles of signed bike routes	Transportation	$1,000,000
3 Major Improvements: Construction of accommodations in Hopkins and Charles Plaza, Redwood and Water Street re-configuration; Engineering and Design of accommodations for Hanover Street from Riverside to Veterans Bridge.	Transportation	$330,000
Small infrastructure improvements including bicycle parking, storm water grate improvements, intersection improvements, mid-block crossings, short paths, curb ramps, or stairway retrofits. (Budget includes E & D costs.)	Transportation	$260,000
On-Call consultant to provide in-house design, engineering, planning and related services to the Traffic Engineering Division. Design for remaining 1/3 of Introductory Network.	Transportation	$150,000
	Total Year 2 Cost:	**$1,740,000**
Year 3: Facility Improvements (Design and Construction)	**Responsibility**	**Cost**
Install designed portion of Introductory Network (approx. 60 miles of bicycle lanes, other pavement markings, or signed routes). $15,000 per mile for est. 20 miles of street markings; $7,000 per mile for est. 40 miles of signed bike routes	Transportation	$580,000
2 Major Improvements: Construction of accommodations for Hanover Street from Riverside to Veterans Bridge.	Transportation	$150,000
Small infrastructure improvements including bicycle parking, storm water grate improvements, intersection improvements, mid-block crossings, short paths, curb ramps, or stairway retrofits. (Budget includes E & D costs.)	Transportation	$260,000
On-Call consultant to provide in-house design, engineering, planning and related services to the Traffic Engineering Division.	Transportation	$100,000
	Total Year 3 Cost	**$1,090,000**

APPENDIX L

Collegetown Network Map



Collegetown Bicycle Network